GCSE

WJEC GCSE in

MATHEMATICS - NUMERACY

ACCREDITED BY WELSH GOVERNMENT

SPECIMEN ASSESSMENT MATERIALS

Teaching from 2015

This Welsh Government regulated qualification is not available to centres in England.

FOR TEACHING FROM 2015
FOR AWARDS FROM 2017

GCSE MATHEMATICS - NUMERACY

SPECIMEN ASSESSMENT MATERIALS

CONTENTS

	Page
Question papers	
UNIT 1: Non-calculator, Higher Tier	7
UNIT 1: Non-calculator, Intermediate Tier	29
UNIT 1: Non-calculator, Foundation Tier	51
UNIT 2: Calculator-allowed, Higher Tier	69
UNIT 2: Calculator-allowed, Intermediate Tier	87
UNIT 2: Calculator-allowed, Foundation Tier	107
Marking schemes	
UNIT 1: Non-calculator, Higher Tier	126
UNIT 1: Non-calculator, Intermediate Tier	131
UNIT 1: Non-calculator, Foundation Tier	135
UNIT 2: Calculator-allowed, Higher Tier	139
UNIT 2: Calculator-allowed, Intermediate Tier	145
UNIT 2: Calculator-allowed, Foundation Tier	149
Assessment grids	153

QUESTION PAPERS

Candidate Name	Centre Number					Candidate Number				
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GCSE

MATHEMATICS - NUMERACY

UNIT 1: NON-CALCULATOR
HIGHER TIER

SPECIMEN PAPER SUMMER 2017

1 HOUR 45 MINUTES

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

INSTRUCTIONS TO CANDIDATES
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 in this booklet.

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.

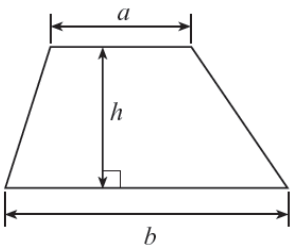
The number of marks is given in brackets at the end of each question or part-question.

The assessment will take into account the quality of your linguistic and mathematical organisation, communication and accuracy in writing in question **7***(a)*.

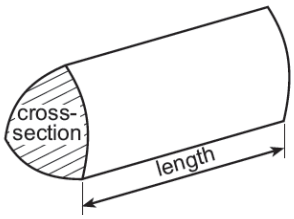
For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1.	**7**	
2.	**14**	
3.	**6**	
4.	**4**	
5.	**3**	
6.	**5**	
7.	**9**	
8.	**7**	
9.	**8**	
10.	**4**	
11.	**13**	
TOTAL	**80**	

Formula list – Higher tier

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

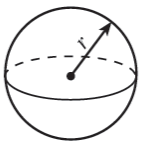


Volume of a prism = area of cross section × length



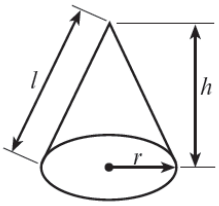
Volume of a sphere $= \frac{4}{3}\pi r^3$

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 $= \pi r l$

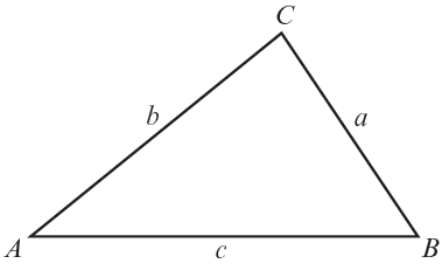


In any triangle *ABC*,

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

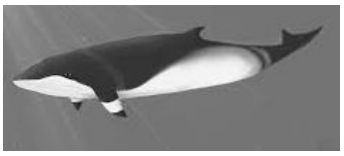
The solutions of $ax^2 + bx + c = 0$ where $a \neq 0$ are given by $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

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 magazine article states:

Each year one third of the world's whale population migrates around the North West coast of Scotland.



A Minke whale is sighted by a number of people in a sea area near North Minch.

In attempting to locate the Minke whale, the following details are known.

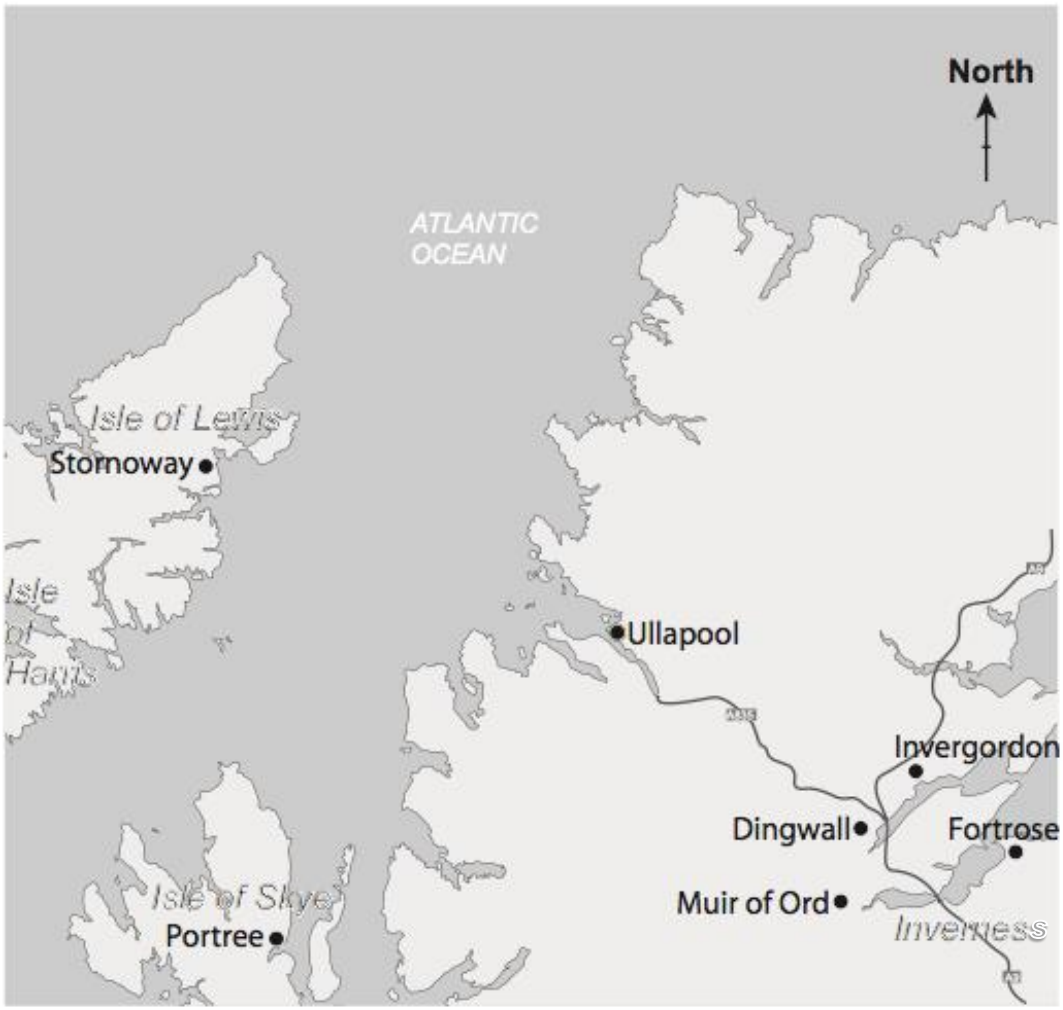
- The distance from Muir of Ord to Dingwall is 10 miles.
- The whale is
  - equidistant from Stornoway and Ullapool,
  - within 30 miles of Portree,
  - further than 10 miles off shore.

(a) Use the map on the next page to indicate possible locations of the sighting of the Minke whale.
You must show all your constructions and working. [5]

(b) Complete the following sentence to give the range of possible bearings of the Minke whale from Stornoway. [2]

The bearing of the Minke whale from Stornaway is between

…… ° and …… °.


North
ATLANTIC
OCEAN
Isle of Lewis
Stornoway
Ullapool
Invergordon
Dingwall
Fortrose
Muir of Ord
Inverness
Isle of Skye
Portree

2. The *Hafod Hotel* swimming pool is currently in need of improvement.

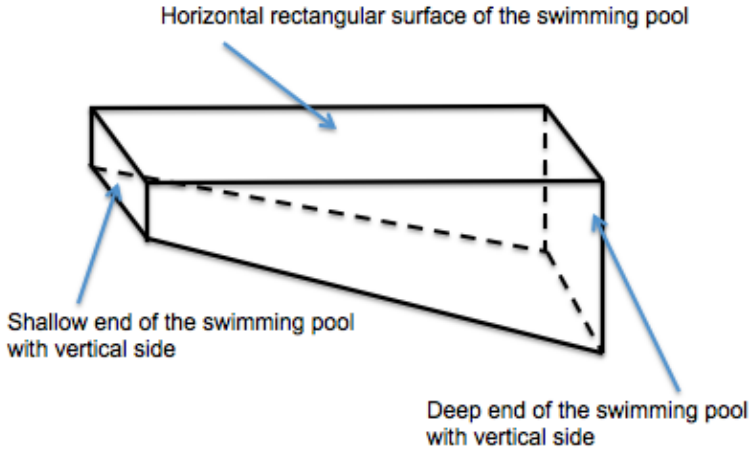


Diagram not drawn to scale

(a) The pool is 1 metre deep at the shallow end, dropping to 3 metres deep at the other end.
The width of the pool is 10 metres and the length is 20 metres.
The length of the sloping floor of the pool is 20·1 metres.

The four walls and the floor within the pool are to be covered in tiles.
This will cost £20 per m^2.

The labour cost of fixing the tiles is £150 per day.
It should take 6 days to tile the pool.

Calculate how much it will cost the hotel to tile the swimming pool. [8]

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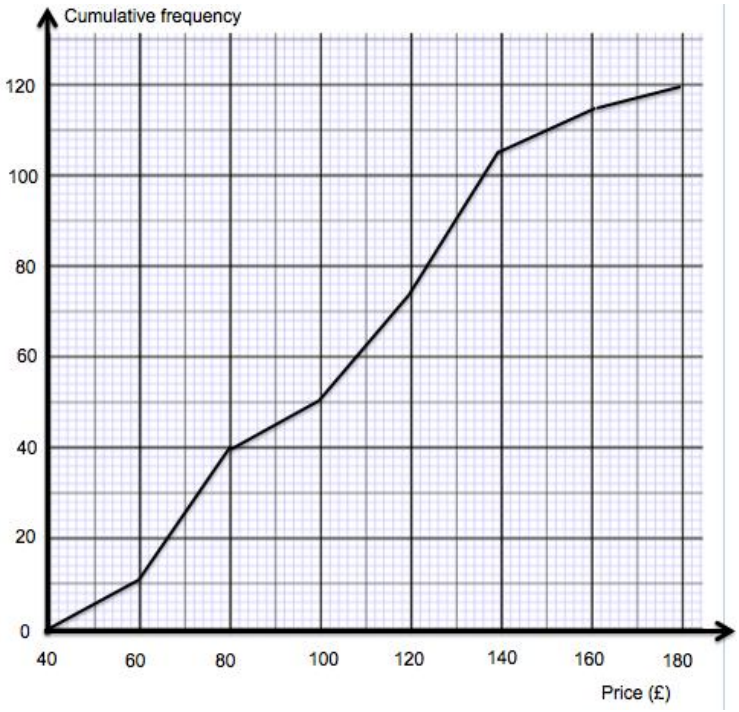
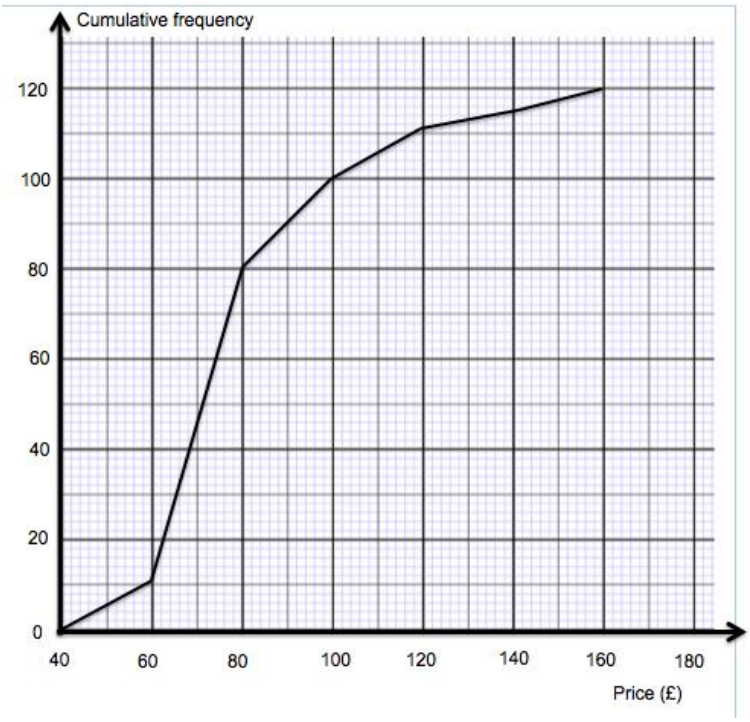
(b) Before agreeing to improve the hotel's swimming pool, the manager of the *Hafod Hotel* decides to check the price of a double room for a night, in hotels with and without swimming pools.

She has grouped her results, 120 hotels with a swimming pool and 120 hotels without a swimming pool.

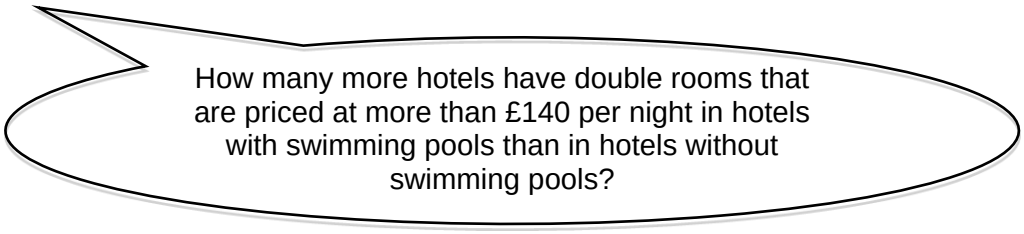
Prices for double rooms at hotels with a swimming pool



Prices for double rooms at hotels without a swimming pool



(i) The *Hafod Hotel* owners look at the manager's findings and ask:



What response should the manager give?
You must show all your working. [2]

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(ii) To help decide whether or not to improve the *Hafod Hotel's* swimming pool, the manager's findings need to be interpreted.

Describe the difference in the distribution of prices for a double room in hotels with a swimming pool compared with those without a swimming pool.

You must use an appropriate average and measure of spread and interpret your findings. [4]

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3. The Royal Mint in Llantrisant in South Wales is the body permitted to manufacture the coins of the United Kingdom.

(a) In March 2013, the Royal Mint estimated the number of coins in circulation.

Coin	Number of coins in circulation (in millions)
£2	394
£1	1526
50p	920
20p	2704
10p	1598
5p	3813
2p	6600
1p	11 293

One particular coin is selected.
The total **value** of the coins in circulation of this selected coin was greater than for any other coin.
Which coin was selected?
Circle your answer. [1]

£2 coin £1 coin 50p coin 10p coin 1p coin

(b) Hari has a gold coin.
It weighs 8g.
What does this weigh in kg?
Circle your answer. [1]

8×10^{3} kg 8×10^{-2} kg 8×10^{-3} kg 8^{-2} kg 8^{-3} kg

(c) How many of these coins could the Royal Mint possibly make from a gold bar weighing 2460g?
Circle your answer. [1]

30 307 310 308 3075

(d) Another gold bar has a mass of 3·86 kg and a volume of 200 cm^3.

Calculate the density, in g/cm^3, of the gold in the bar. [3]

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4. In a factory, Machine A is three times as quick as Machine B in assembling identical circuit boards.
Machine A is allocated two and a half times as many of these circuit boards to assemble as Machine B.

Machine B took 4 hours to assemble all of its allocation.

How long did it take for Machine A to complete its allocation?
Give your answer in hours and minutes. [4]

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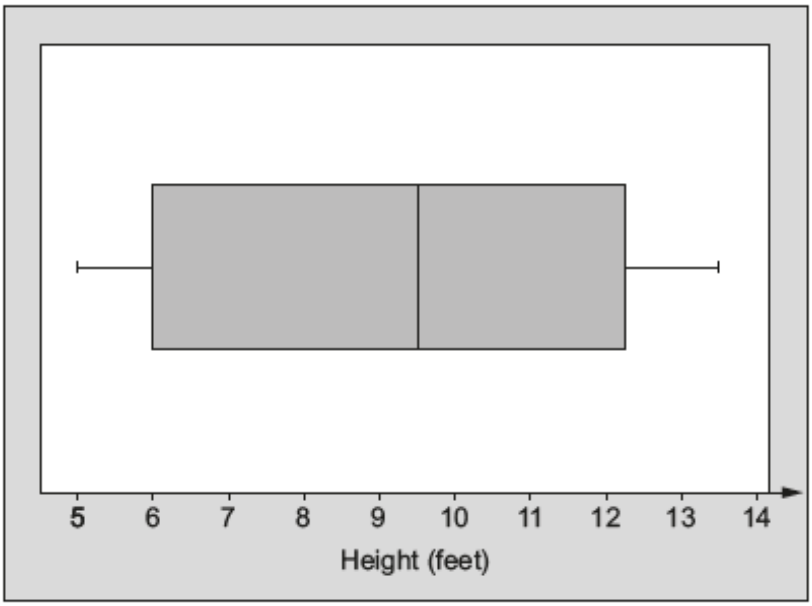
5. The box-and-whisker plot shows information about the height, in feet, of waves measured at a beach on a particular day.



(a) About what fraction of the waves measured were less than 6 feet? [1]

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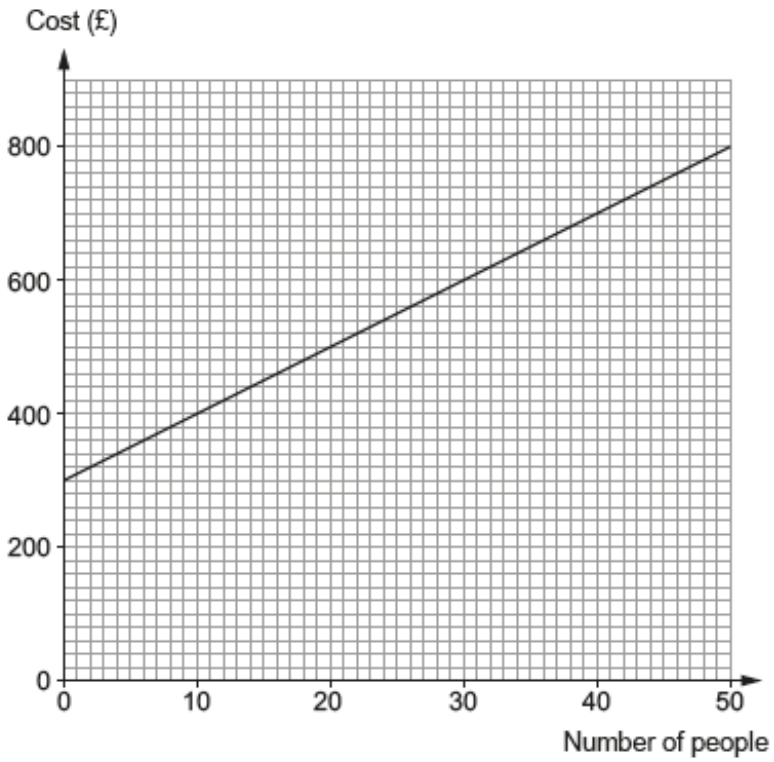
(b) Circle either TRUE or FALSE for each of the following statements. [2]

The smallest wave measured was 5 feet.	TRUE	FALSE
The range of the heights of the waves measured was 6·5 feet.	TRUE	FALSE
Approximately a half of the waves measured were more than 9·5 feet.	TRUE	FALSE
Approximately a quarter of the waves measured were between 6 feet and 9·5 feet.	TRUE	FALSE
The biggest wave measured was 12·25 feet.	TRUE	FALSE

6. Ffion has organised a conference in the *Hafod Hotel*.
The hotel has given Ffion a graph to illustrate the costs for room hire with refreshments for different numbers of people.



(a) (i) Calculate the gradient of the straight line graph. [2]

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(ii) Explain what the gradient tells you about the conference costs. [1]

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(iii) The straight line graph intersects the vertical axis at £300.
Explain what this tells you about the conference costs. [1]

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(b) 20 more people arrived at the conference than Ffion had expected.
The hotel prepared extra food and set out more chairs in the conference room.
Calculate how much **extra** Ffion has to pay the hotel. [1]

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

A company uses its logo in every part of its business.
The smallest version, used on letterheads, has a perimeter of 9 cm and an area of 5 cm^2.
The largest similar version, used on their delivery vans, has a perimeter of 2·7 metres.

Painting the logo on the delivery vans costs £200 per m^2.

How much it would cost to paint one logo on the side of a van?
You must show all your working. [7]

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(b) Rhodri uses formulae to calculate the perimeters and areas of the logos.

In the formulae, a, b, c and d are all lengths.

(i) Which **one** of the following formulae might be used to calculate the perimeter of the logo?
Circle your answer. [1]

Perimeter = $a(b + 2c + d)$

Perimeter = $a - 5b + 2c - d$

Perimeter = $ab + 2c + d$

Perimeter = $a + b + 2c + d^2$

(ii) Which **one** of the following formulae might be used to calculate the area of the logo?
Circle your answer. [1]

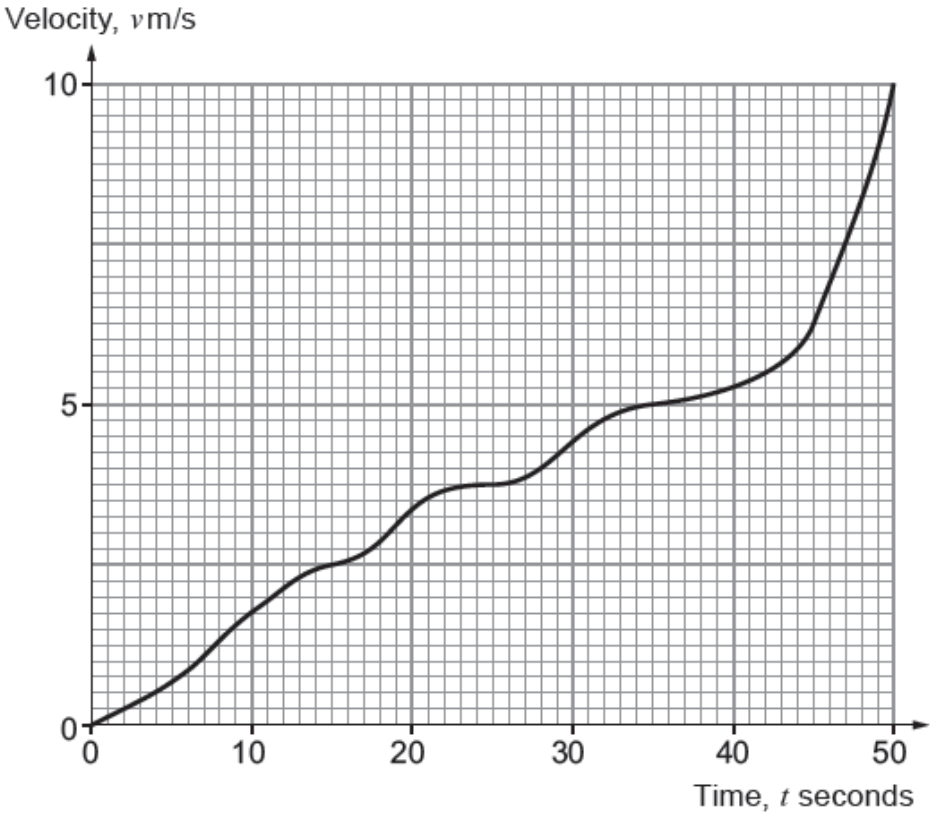
Area = $ad(b + 2c^2)$

Area = $a(5b + 2c + d^2)$

Area = $3(a + b + 2c) + d$

Area = $a(5b + 2c - d)$

8. A velocity-time graph, representing a 50-second journey of a bicycle accelerating from 0 m/s, is shown below.



(a) Calculate an estimate for the acceleration at time t = 30 seconds.
You must give the units for your answer. [4]

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Acceleration: ……

(b) Calculate an estimate for the distance travelled by the bicycle in the first 30 seconds. [3]

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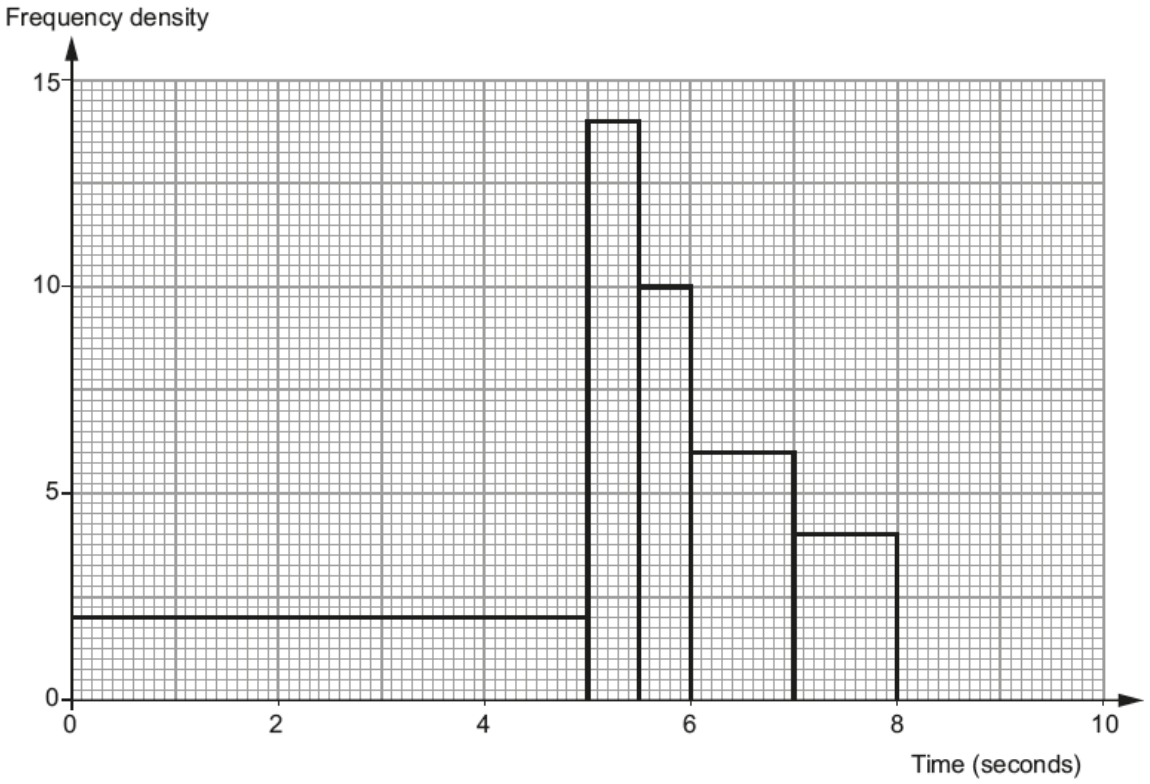
Distance travelled: …….

9. Dewi records the times a group of pupils take to type a particular message into their mobile phones.

Dewi began to draw a histogram to shows the results.



(a) Two pupils took between 8 seconds and 10 seconds to type the message.
Use this information to complete Dewi's histogram.
You must show all your working. [2]

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(b) Circle either TRUE or FALSE for each of the following statements. [2]

2 pupils took less than 5 seconds to type the message.	TRUE	FALSE
2 more pupils took between 6 and 7 seconds to type the message than took between 7 and 8 seconds.	TRUE	FALSE
Somebody definitely typed the message in less than 1 second.	TRUE	FALSE
Somebody definitely typed the message in more than 9 seconds.	TRUE	FALSE
Most pupils typed the message between 5 and 5·5 seconds.	TRUE	FALSE

(c) Dewi says:

"I think more than 60% of the pupils took between 5 seconds and 7 seconds to type the message."

By calculating how many pupils typed the message, decide whether Dewi is correct or not.
You must show all your working. [4]

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10. A shopkeeper pays £120 for an mp3 player.
He wishes to put a marked price on the mp3 player so that, in the forthcoming sale, when he gives a discount of 25% on the marked price, he will still make a profit of 20% on the price paid for the mp3 player.
Find the marked price. [4]

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11. *(a)* In 2009, approximate costs for building 1 mile of road in Wales were published, as given below.

Type of road	Approximate cost per mile
Single carriageway	£8 million
Dual carriageway	£13 million
Motorway	£24 million

A road was built in 2009 that went 10% over the published costs.

This road is 28 miles long, with $\frac{3}{4}$ of its length being a single carriageway and the remainder being a dual carriageway.

(i) Calculate an estimate of the cost of building the single carriageway. [3]

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(ii) Calculate an estimate of the cost of building the remaining dual carriageway.
Circle your answer. [1]

£10 million £10^6 £9×10^7 £1×10^8 £14.3 million

(b) Most motorways in the UK are free to use.
The cost of building motorways has increased.
A toll motorway means that drivers have to pay to drive their vehicle on it.
The toll payments help recover the building costs.

Built between	Motorway	Approximate length	Approximate total build cost
1960 and 1976	M62	100 miles	£$7{\cdot}7 \times 10^8$
1975 and 1985	M25	120 miles	£$9{\cdot}2 \times 10^8$
2000 and 2003	M6 toll	30 miles	£$9{\cdot}0 \times 10^8$

Use the information in the table above to answer the following questions.

(i) Was there an increase in the cost of building **one mile** of motorway between the time when the M62 was built and the time when the M25 was built?
You must show all your working to justify your answer. [4]

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(ii) When the M6 toll motorway was opened, in 2003, it cost £2 for a car and £10 for a lorry to use.
By 2012, the cost for a car had increased to £5.50 and the cost for a lorry had increased to £11.

You may assume that:

- approximately 39 000 vehicles use the M6 toll motorway each day
- there were 1000 more cars than lorries using the motorway each day.

By making relevant approximations, estimate how many years of toll fees it will take to recover the cost of building the M6 toll motorway.
You must show all your working and state any further assumptions that you make.

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Candidate Name	Centre Number					Candidate Number				
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GCSE

MATHEMATICS - NUMERACY

UNIT 1: NON-CALCULATOR
INTERMEDIATE TIER

SPECIMEN PAPER SUMMER 2017

1 HOUR 45 MINUTES

ADDITIONAL MATERIALS
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A ruler, protractor and a pair of compasses may be required.

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

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INFORMATION FOR CANDIDATES

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

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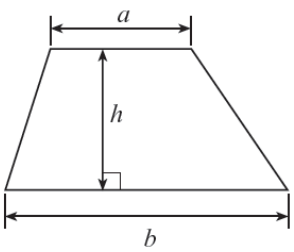
For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1.	**4**	
2.	**5**	
3.	**8**	
4.	**6**	
5.	**4**	
6.	**9**	
7.	**5**	
8.	**7**	
9.	**14**	
10.	**6**	
11.	**4**	
12.	**3**	
13.	**5**	
TOTAL	**80**	

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

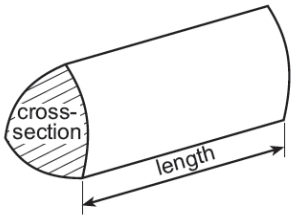
The assessment will take into account the quality of your linguistic and mathematical organisation, communication and accuracy in writing in question **4**.

Formula list

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



Volume of a prism = area of cross section × length



1. Martina walks **650 metres due North**.

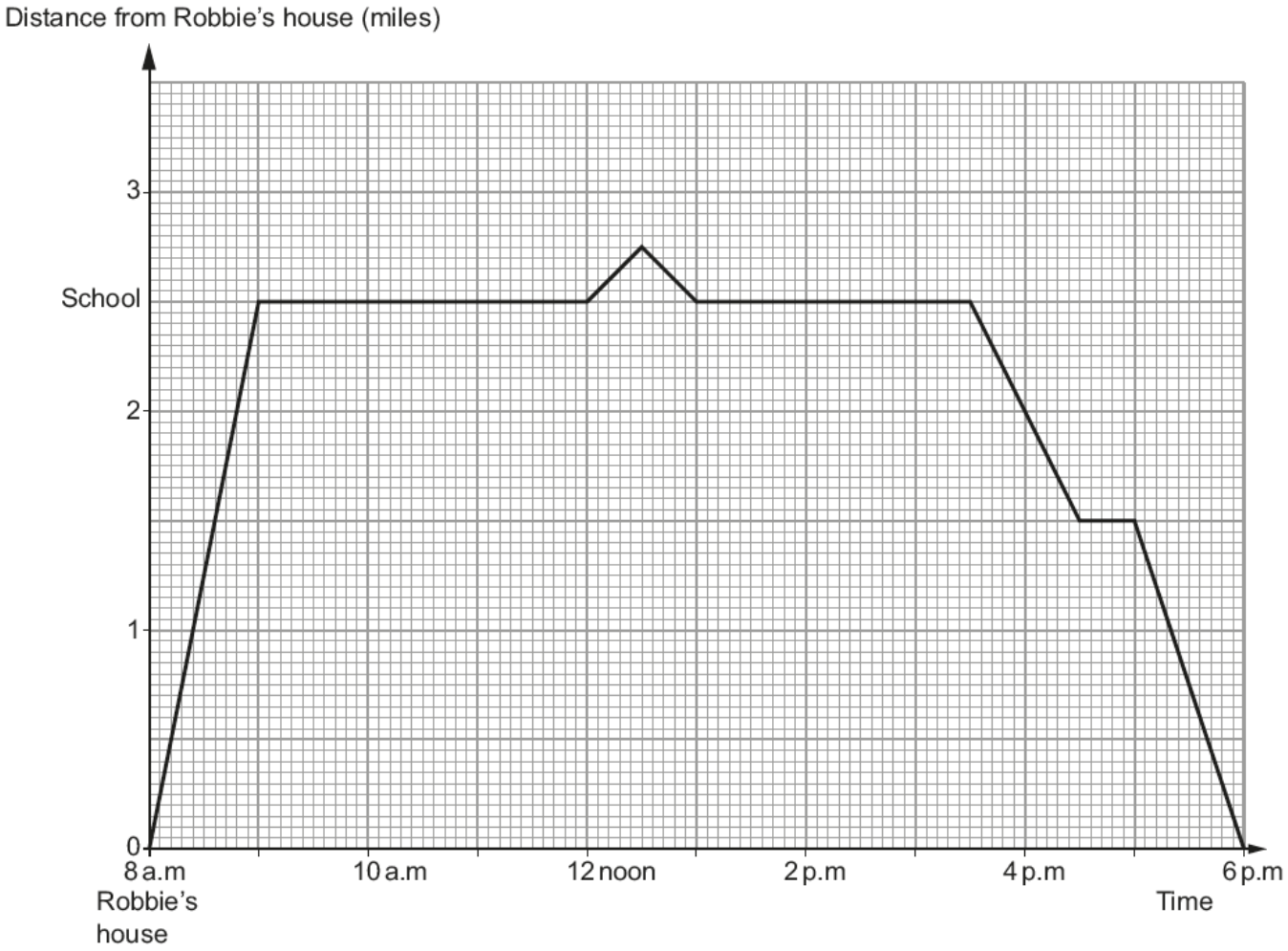
She then turns **right through an angle of 37°** and then walks a further **500 metres in a straight line.**

Using a scale of **1cm to represent 100 m**, draw an accurate scale drawing to show the above information.
The starting point is given.

Use your completed drawing to find the actual distance Martina is away from her starting point. [4]

Actual distance from the starting point = ...

2. The travel graph below illustrates Robbie's journey to and from school one day.



(a) (i) At what time did Robbie arrive at school?
Circle your answer. [1]

8:00 a.m. 8:30 a.m. 3:30 p.m. 8:50 a.m. 9:00 a.m.

(ii) At what time was Robbie furthest away from his house?
Circle your answer. [1]

12:15 p.m. 6 p.m. 12:30 p.m. 3:30 p.m. 12 noon

(iii) Which one of the following statements is correct?
Circle your answer. [1]

A Robbie's average speed was greater between 8 a.m. and 9 a.m. than it was between 5 p.m. and 6 p.m.

B Robbie's average speed was the same between 8 a.m. and 9 a.m. as it was between 5 p.m. and 6 p.m.

C Robbie's average speed was less between 8 a.m. and 9 a.m. than it was between 5 p.m. and 6 p.m.

D It is not possible to tell anything about Robbie's average speed between 8 a.m. and 9 a.m. or between 5 p.m. and 6 p.m. from the information given.

(b) The travel graph shown is correct.
Robbie is 11 years old and tells his teacher,

'I walked to school, but actually had to run fast for the last 15 minutes to get there on time.'

'I didn't leave the school classroom all day'.

For each of Robbie's statements, decide whether he was telling the truth or not.
You must give a reason for each of your answers below:

(i) 'I walked to school but I ran for the last 15 minutes.'

Is this true? Put a tick in the box: Yes ☐ No ☐ [1]
Reason:

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(ii) 'I stayed in the classroom all day.'

Is this true? Put a tick in the box: Yes ☐ No ☐ [1]
Reason:

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3. *Dragon CarCare* is a car cleaning company.



Dragon CarCare is charged the following costs for products and services.

Car cleaning products	Costs
Car wash liquid	£1 per 5 litre bottle
Window spray	£2 per 2 litre bottle
Wax	£2.50 per 2 litre drum
Cloths and sponges	10 p each

Service	Unit cost
Water	£2 per m^3 + Standing charge £4 per month
Electricity	25p per kWh + Standing charge £10 per month + 5% VAT

During June *Dragon CarCare* used the following quantities of products.

Car cleaning products	Quantity used
Car wash liquid	12 bottles
Window spray	8 bottles
Wax	6 drums
Cloths and sponges	100 cloths + 100 sponges

At the beginning and at the end of June, the meter readings for water and electricity were recorded.

Service	Time: 00:01 Date: 1 June 2014 Meter reading	Time: Midnight Date: 30 June 2014 Meter reading
Water	3450 m^3	3950 m^3
Electricity	3000 kWh	3800 kWh

(a) How much did *Dragon CarCare* spend on car cleaning products in June 2014? [3]

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(b) Calculate the total cost of the water and electricity used by *Dragon CarCare* during June 2014. [4]

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(c) The operating costs for *Dragon CarCare* is the sum of the water costs, the electricity costs and the cost of the products used.

Calculate the operating costs for *Dragon CarCare* for June 2014 [1]

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4. *You will be assessed on the quality of your organisation, communication and accuracy in writing in this question.*

Sam and Laura own $\frac{3}{4}$ of the company *Dragon CarCare*.

They each own $\frac{1}{2}$ of this $\frac{3}{4}$ share.

It cost a total of £8000 to set up the original business.
This set-up cost was paid in proportion to the share each person has in the business.
After 6 months, Laura received £3200 as her share of the profits so far.

Did Laura make a profit on her original investment or did she make a loss?

You must show all your working and state how much profit or loss Laura made.

[6]

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5. Hari lives in Chester.
He wanted to catch the ferry to Ireland, leaving Holyhead at 12:05 p.m.
Passengers must board the ferry at least 30 minutes before sailing time.

In planning his journey, he allowed himself 20 minutes to travel from the station at Holyhead to the ferry.
He wanted to catch the latest possible train from Chester to be sure of arriving on board the ferry in time.

Part of the train timetable he used is shown below.

Chester (depart)	07:19	08:55	09:58	10:24
Holyhead (arrival)	09:22	10:35	11:22	12:23

Hari caught the train he wanted, and the train arrived at Holyhead station on time.
The time to travel from the station to the ferry took a total of 25 minutes.

Calculate the total time taken between Hari departing from Chester and arriving at the ferry. [4]

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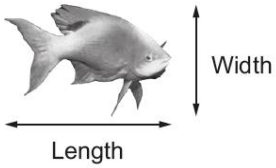
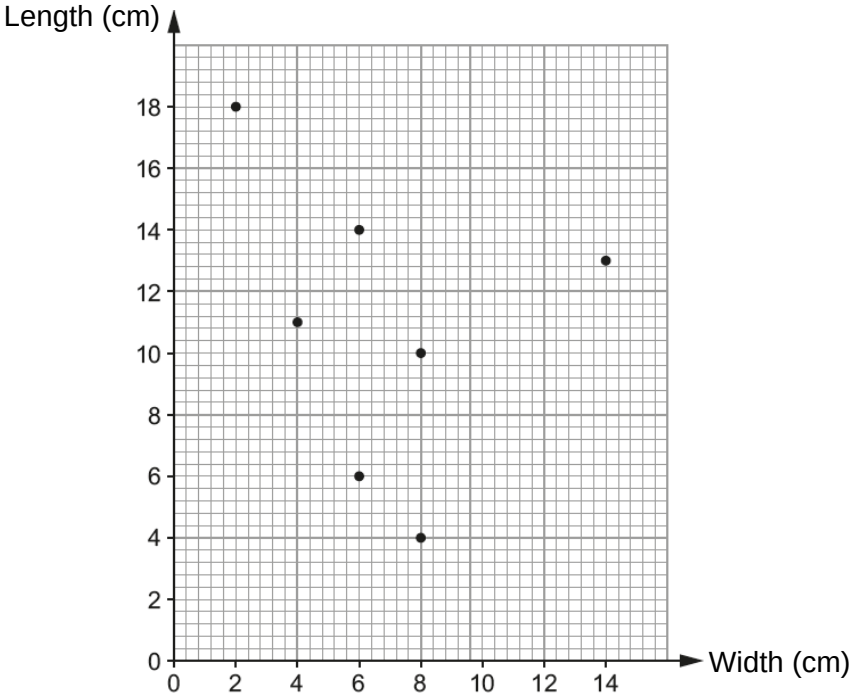
Time taken = ...

6. Nerys takes her 3 cousins, Ben, Elwyn and Denny, to an aquarium in North Wales.

(a) Denny records estimates for the length and width of some of the fish he sees at the aquarium.



He draws a scatter diagram as shown below.



(i) One of the fish is 4 cm wide.
Write down its length. [1]

…… cm

(ii) Another fish is 14 cm long.
Write down its width. [1]

…… cm

(iii) The width of a yellow fish is exactly the same as its length.
Indicate on the scatter diagram which point you think represents the yellow fish. [1]

(b)

Remember:

14 pounds = 1 stone
1 kg ≈ 2·2 pounds

Nerys sees a very big fish.

She is told it weighs 15 kg.

Nerys herself weighs 9 stone 4 pounds.

Complete the following sentence. [6]

Nerys weighs approximately …… times as much as the fish.

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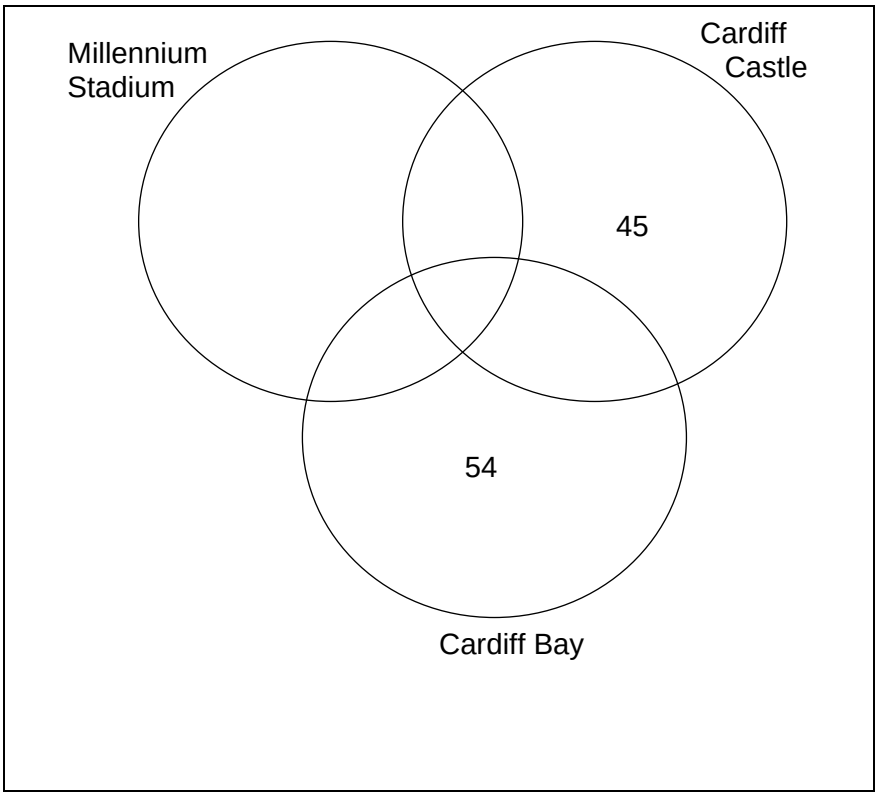
7. 200 visitors to Cardiff completed a questionnaire.

All 200 visitors had visited at least one of the following attractions: Cardiff Castle, the Millennium Stadium and Cardiff Bay.
25 of the visitors had visited Cardiff Castle and the Millennium Stadium and, of these, 15 had visited all three attractions.
91 of the visitors had visited the Millennium Stadium.
88 had visited Cardiff Castle.
101 had visited Cardiff Bay.
Some further information is given on the Venn diagram below.

How many visitors had visited the Millennium Stadium but not Cardiff Castle or Cardiff Bay? [5]



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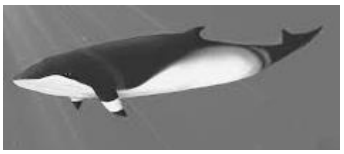
……. visitors had visited the Millennium Stadium but not Cardiff Castle or Cardiff Bay.

8. A magazine article states:

Each year one third of the world's whale population migrates around the North West coast of Scotland.



A Minke whale is sighted by a number of people in a sea area near North Minch

In attempting to locate the Minke whale, the following details are known.

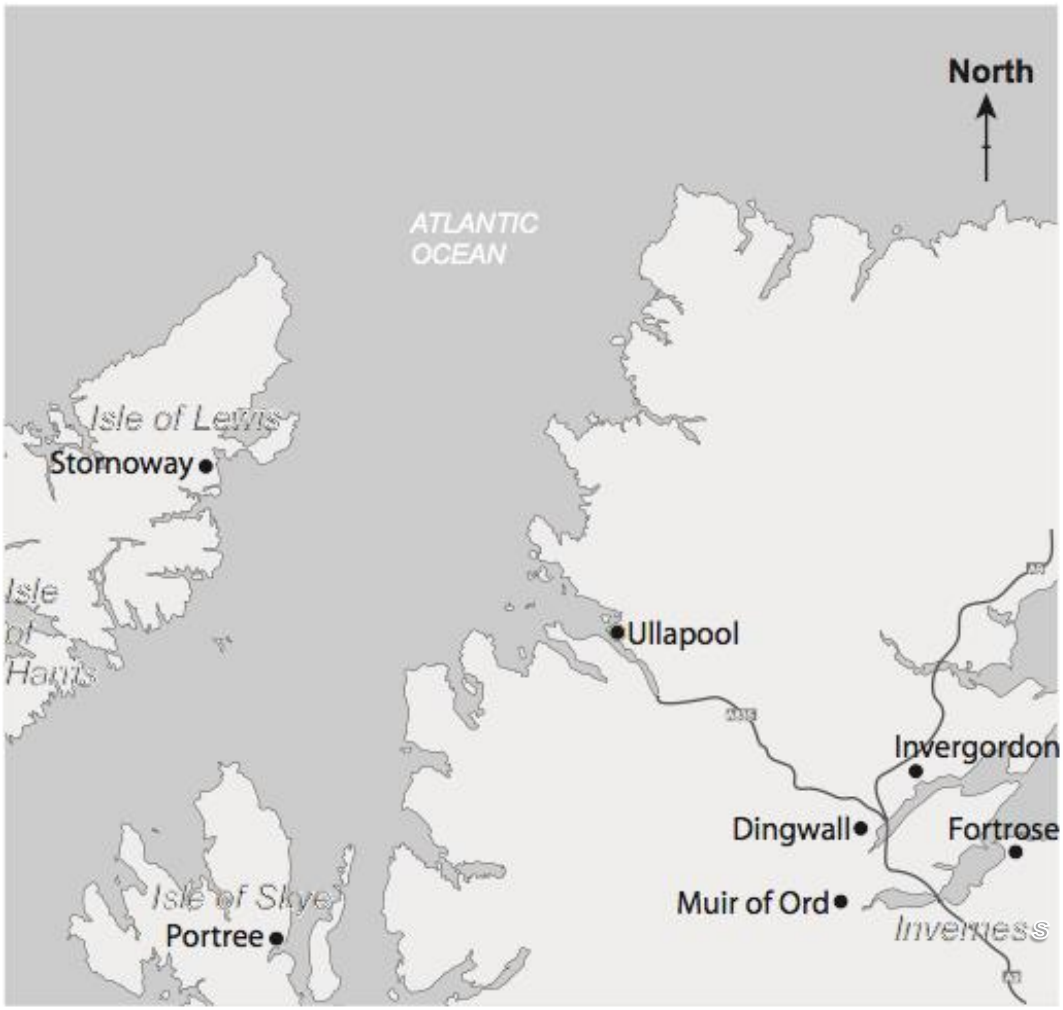
- The distance from Muir of Ord to Dingwall is 10 miles.
- The whale is
  - equidistant from Stornoway and Ullapool,
  - within 30 miles of Portree,
  - further than 10 miles off shore.

(a) Use the map on the next page to indicate possible locations of the sighting of the Minke whale.
You must show all your constructions and working. [5]

(b) Complete the following sentence to give the range of possible bearings of the Minke whale from Stornoway. [2]

The bearing of the Minke whale from Stornaway is between

…… ° and …… °.


North
ATLANTIC
OCEAN
Isle of Lewis
Stornoway
Ullapool
Invergordon
Dingwall
Fortrose
Muir of Ord
Inverness
Isle of Skye
Portree

9. The *Hafod Hotel* swimming pool is currently in need of improvement.

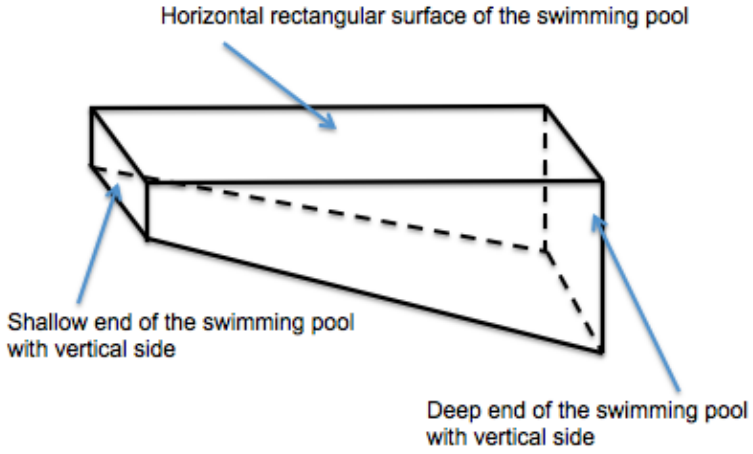


Diagram not drawn to scale

(a) The pool is 1 metre deep at the shallow end, dropping to 3 metres deep at the other end.
The width of the pool is 10 metres and the length is 20 metres.
The length of the sloping floor of the pool is 20·1 metres.

The four walls and the floor within the pool are to be covered in tiles.
This will cost £20 per m^2.

The labour cost of fixing the tiles is £150 per day.
It should take 6 days to tile the pool.

Calculate how much it will cost the hotel to tile the swimming pool. [8]

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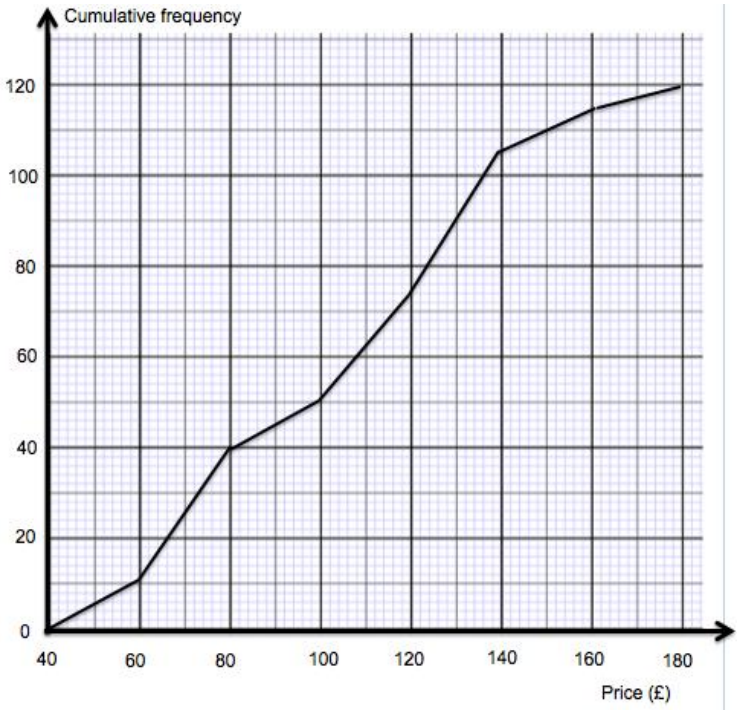
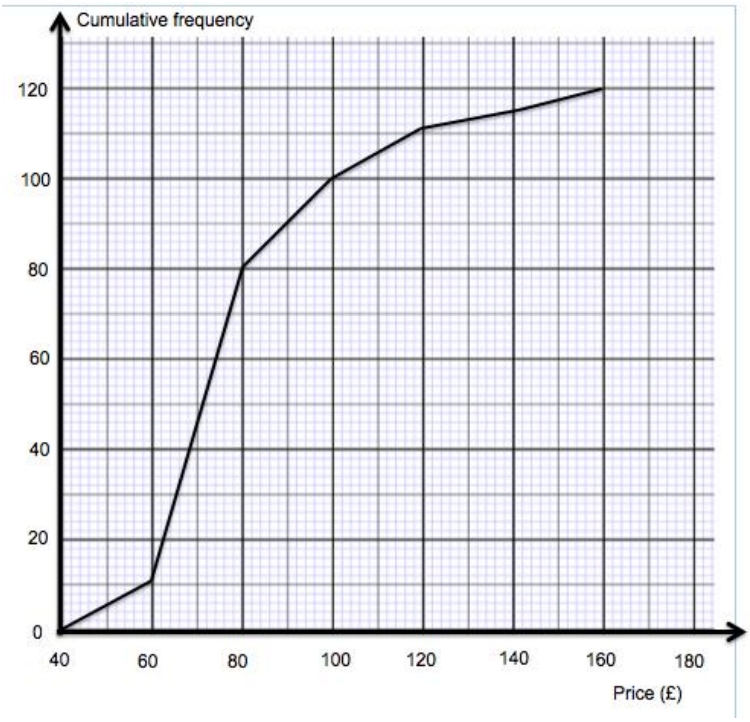
(b) Before agreeing to improve the hotel's swimming pool, the manager of the *Hafod Hotel* decides to check the price of a double room for a night, in hotels with and without swimming pools.

She has grouped her results, 120 hotels with a swimming pool and 120 hotels without a swimming pool.

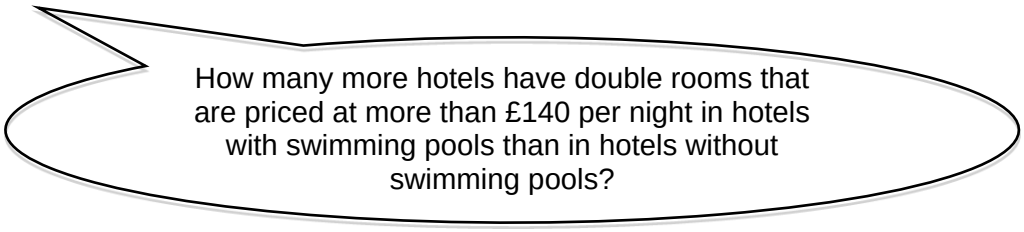
Prices for double rooms at hotels with a swimming pool



Prices for double rooms at hotels without a swimming pool



(i) The *Hafod Hotel* owners look at the manager's findings and ask:



What response should the manager give?
You must show all your working. [2]

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(ii) To help decide whether or not to improve the *Hafod Hotel's* swimming pool, the manager's findings need to be interpreted.

Describe the difference in the distribution of prices for a double room in hotels with a swimming pool compared with those without a swimming pool.

You must use an appropriate average and measure of spread and interpret your findings. [4]

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10. The Royal Mint in Llantrisant in South Wales is the body permitted to manufacture the coins of the United Kingdom.

(a) In March 2013, the Royal Mint estimated the number of coins in circulation.

Coin	Number of coins in circulation (in millions)
£2	394
£1	1526
50p	920
20p	2704
10p	1598
5p	3813
2p	6600
1p	11 293

One particular coin is selected.
The total **value** of the coins in circulation of this selected coin was greater than for any other coin.
Which coin was selected?
Circle your answer. [1]

£2 coin £1 coin 50p coin 10p coin 1p coin

(b) Hari has a gold coin.
It weighs 8g.
What does this weigh in kg?
Circle your answer. [1]

8×10^{3} kg 8×10^{-2} kg 8×10^{-3} kg 8^{-2} kg 8^{-3} kg

(c) How many of these coins could the Royal Mint possibly make from a gold bar weighing 2460g?
Circle your answer. [1]

30 307 310 308 3075

(d) Another gold bar has a mass of 3·86 kg and a volume of 200 cm^3.

Calculate the density, in g/cm^3, of the gold in the bar. [3]

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11. In a factory, Machine A is three times as quick as Machine B in assembling identical circuit boards.
Machine A is allocated two and a half times as many of these circuit boards to assemble as Machine B.

Machine B took 4 hours to assemble all of its allocation.

How long did it take for Machine A to complete its allocation?
Give your answer in hours and minutes. [4]

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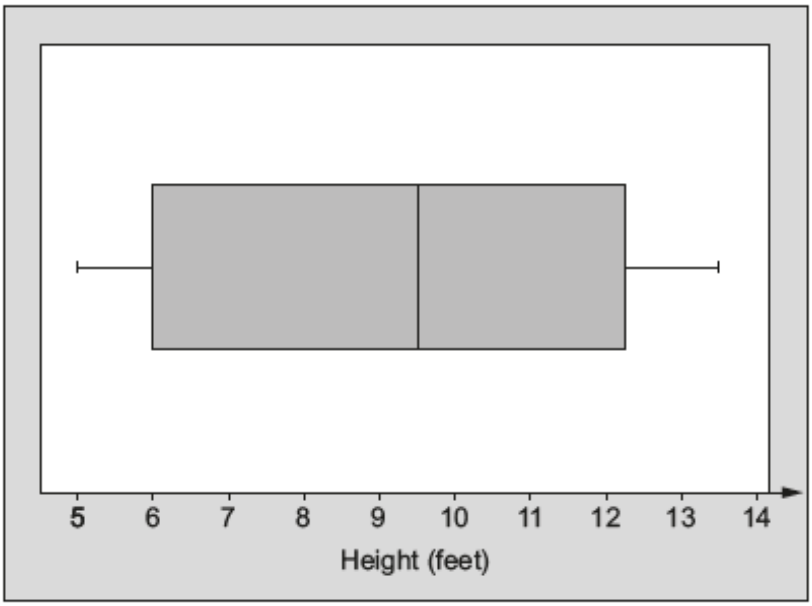
12. The box-and-whisker plot shows information about the height, in feet, of waves measured at a beach on a particular day.



(a) About what fraction of the waves measured were less than 6 feet? [1]

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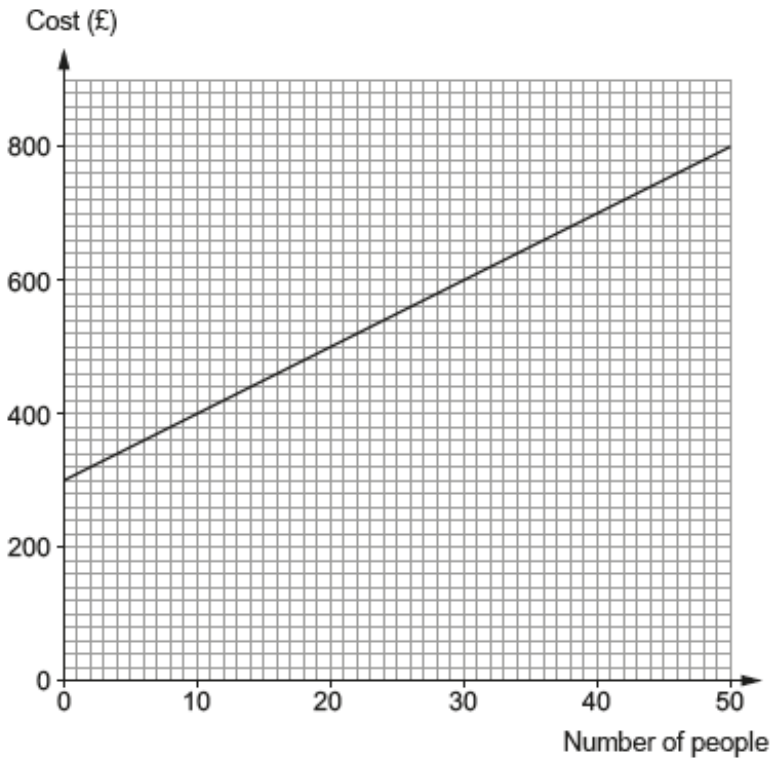
(b) Circle either TRUE or FALSE for each of the following statements. [2]

The smallest wave measured was 5 feet.	TRUE	FALSE
The range of the heights of the waves measured was 6·5 feet.	TRUE	FALSE
Approximately a half of the waves measured were more than 9·5 feet.	TRUE	FALSE
Approximately a quarter of the waves measured were between 6 feet and 9·5 feet.	TRUE	FALSE
The biggest wave measured was 12·25 feet.	TRUE	FALSE

13. Ffion has organised a conference in the *Hafod Hotel*.
The hotel has given Ffion a graph to illustrate the costs for room hire with refreshments for different numbers of people.



(a) (i) Calculate the gradient of the straight line graph. [2]

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(ii) Explain what the gradient tells you about the conference costs. [1]

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(iii) The straight line graph intersects the vertical axis at £300.
Explain what this tells you about the conference costs. [1]

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(b) 20 more people arrived at the conference than Ffion had expected.
The hotel prepared extra food and set out more chairs in the conference room.
Calculate how much **extra** Ffion has to pay the hotel. [1]

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Candidate Name	Centre Number					Candidate Number				
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GCSE

MATHEMATICS - NUMERACY

UNIT 1: NON-CALCULATOR
FOUNDATION TIER

SPECIMEN PAPER SUMMER 2017

1 HOUR 30 MINUTES

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

INSTRUCTIONS TO CANDIDATES
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 in this booklet.

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.

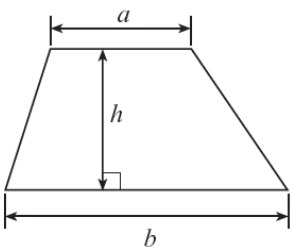
The number of marks is given in brackets at the end of each question or part-question.

The assessment will take into account the quality of your linguistic and mathematical organisation, communication and accuracy in writing in question **3***(c)*.

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1.	**7**	
2.	**7**	
3.	**13**	
4.	**7**	
5.	**4**	
6.	**5**	
7.	**4**	
8.	**4**	
9.	**9**	
10.	**5**	
TOTAL	**65**	

Formula list

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



1. The table below shows the number of athletic medals won by 5 countries in the 2014 Glasgow Commonwealth Games.
One of the entries is missing.

Country	Gold	Silver	Bronze	Total
AUSTRALIA	8	1	3	**12**
SCOTLAND	1	2	1	**4**
CANADA	5	2	10	**17**
JAMAICA	10	3		**19**
WALES	0	2	1	**3**

(a) Complete the table to show the number of athletic Bronze medals that were won by Jamaica. [1]

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(b) Draw a pictogram to represent the **Total** number of medals won by each of the 5 countries.
You must decide on an appropriate key, making it clear how many medals each symbol represents. [4]

KEY:

Country	
AUSTRALIA	
SCOTLAND	
CANADA	
JAMAICA	
WALES	

(c) The table below shows the total number of medals Wales won (in all sports) in the 5 Commonwealth Games before 2014.

Year and venue	2010 Delhi	2006 Melbourne	2002 Manchester	1998 Kuala Lumpur	1994 Victoria
Number of medals	19	19	31	15	19

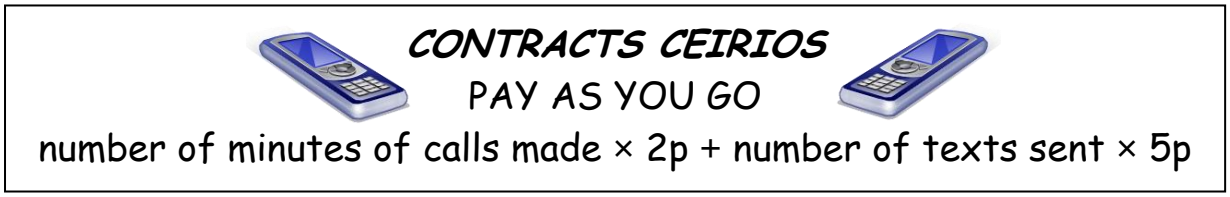
(i) What is the median of the number of medals won by Wales during these 5 Commonwealth Games?
Circle your answer. [1]

31 2002 16 19 Can't tell

(ii) What is the range of the number of medals won by Wales over these 5 Commonwealth Games?
Circle your answer. [1]

31 2002 16 19 Can't tell

2. Salma and Dafydd are looking to change their mobile phone contracts.
They see two deals.



(a) What would be the total cost of paying the *Banana Phones* monthly fee for 7 months?
Circle your answer. [1]

£363 £315 £415 £235 £378

(b) Salma thinks she makes around 800 minutes of calls and sends around 500 texts in a month.
Dafydd thinks he makes around 600 minutes of calls and sends around 700 texts in a month.

Based on the information above, which deal would be better value for Salma and which deal would be better value for Dafydd?
You must show all your working. [6]

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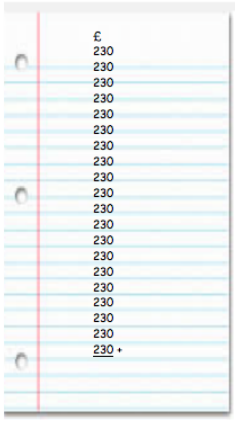
3. The *Hafod Hotel* has 20 bedrooms.

Single bed £230

(a) Andrew is the deputy manager.
He is calculating the cost of buying 20 new single beds.

Andrew writes out a sum with £230 written 20 times.



Describe a better method that Andrew could use to calculate the cost of 20 beds at £230 each.
Work out the total cost of these 20 beds using your suggested method. [2]

Method:

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Total cost of 20 beds = £……

(b) Iona is the hotel manager.
Iona says that 2 single beds are needed for each bedroom, so the hotel needs 40 new single beds not 20.
Describe the quickest way for Andrew to now work out the total cost of the 40 beds.
Write down the total cost of 40 beds. [2]

Method:

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Total cost of 40 beds = £……

(c) *You will be assessed on the quality of your organisation, communication and accuracy in writing in this part of the question.*

Iona is planning to buy new tables and chairs for the hotel dining room.

Table £150

Chair £49.50

Iona has a budget of £3100.
She decides to buy 10 tables and as many chairs as she can afford within her budget.

How many chairs could Iona afford to buy?
How much money would she have left from her budget?
You must show all your working. [9]

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4. *(a)* The *Hafod Hotel* has a small swimming pool for the use of guests.
The pool has 4 vertical sides and a rectangular horizontal floor.

The width of the floor of the pool is 10 metres and the length is 20 metres.

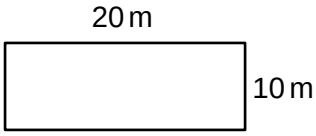

Diagram not drawn to scale

(i) Sealant is to be applied around the perimeter of the floor of the swimming pool.
What is the perimeter of the floor of the swimming pool?
Circle your answer. [1]

30 metres 200 metres 60 metres 3000 cm 50 metres

(ii) The floor of the swimming pool is to be painted with a waterproof coating.
Calculate the area of the floor of the swimming pool. [2]

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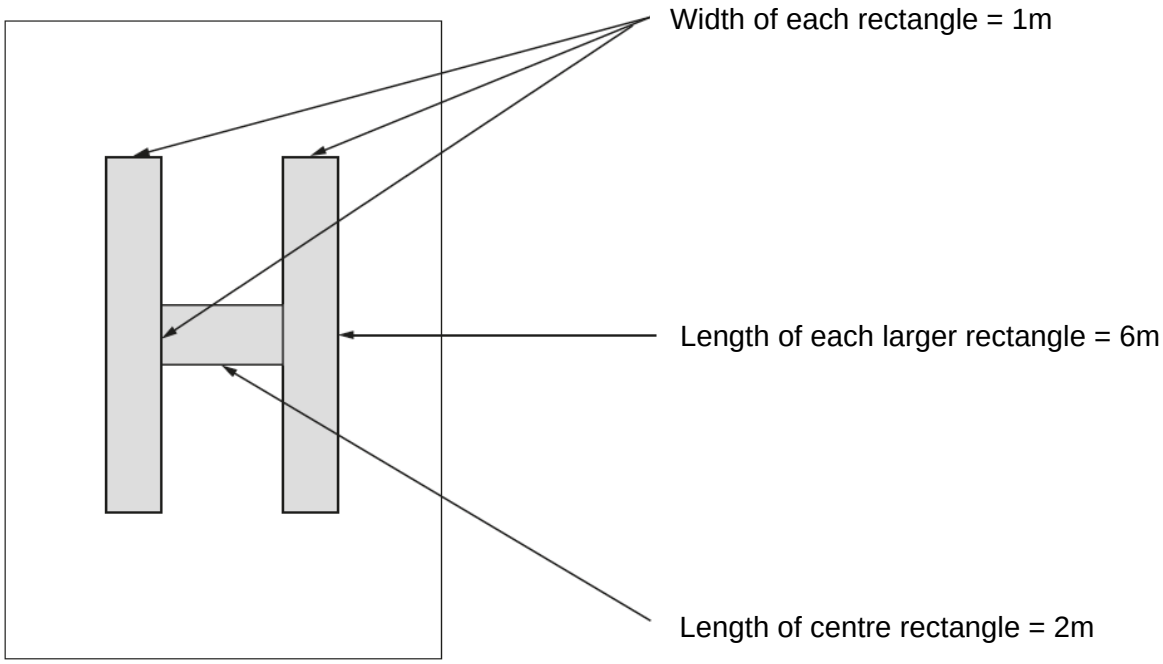
(b) The hotel would like to make the letter H using tiles in the **centre of the floor** of the swimming pool.



A plan is shown below.
Complete the plan by inserting all the missing measurements. [4]

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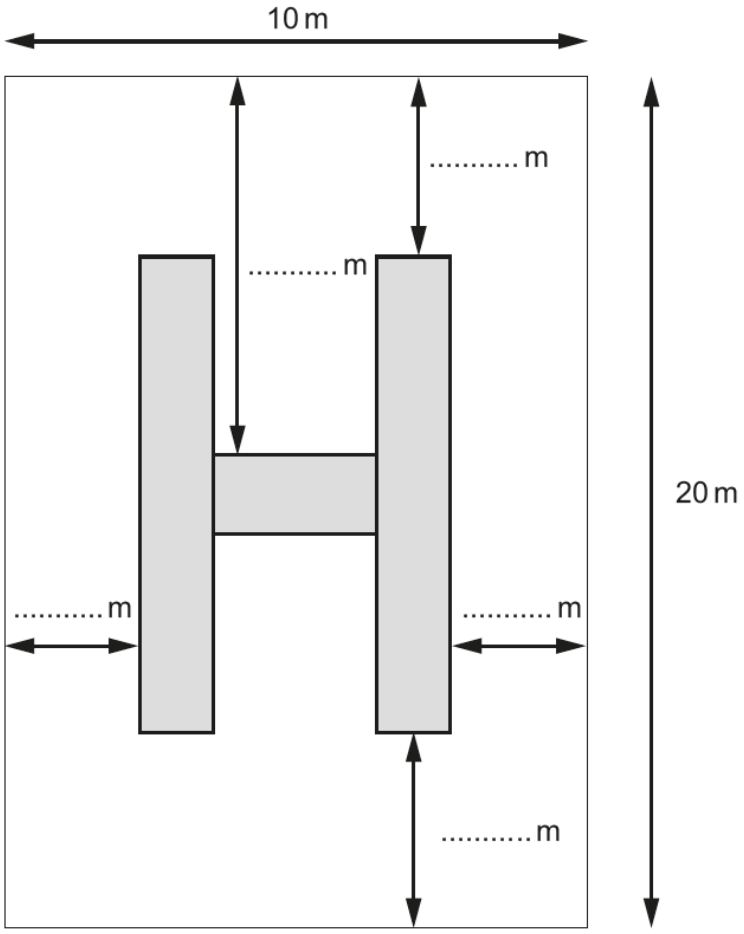


Diagram not drawn to scale

5. Martina walks **650 metres due North**.

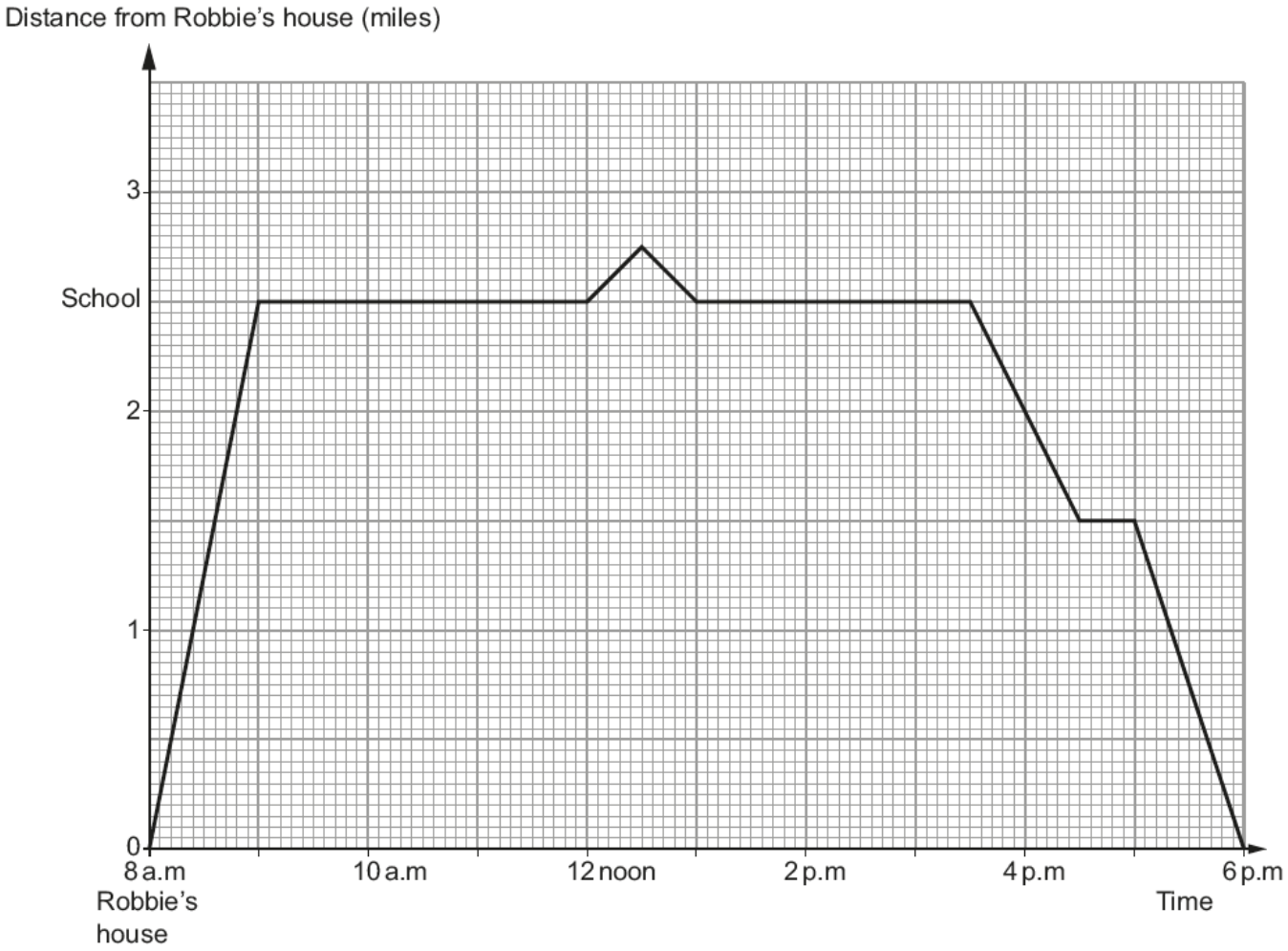
She then turns **right through an angle of 37°** and then walks a further **500 metres in a straight line.**

Using a scale of **1cm to represent 100 m**, draw an accurate scale drawing to show the above information.
The starting point is given.

Use your completed drawing to find the actual distance Martina is away from her starting point. [4]

Actual distance from the starting point = ...

6. The travel graph below illustrates Robbie's journey to and from school one day.



(a) (i) At what time did Robbie arrive at school?
Circle your answer. [1]

8:00 a.m. 8:30 a.m. 3:30 p.m. 8:50 a.m. 9:00 a.m.

(ii) At what time was Robbie furthest away from his house?
Circle your answer. [1]

12:15 p.m. 6 p.m. 12:30 p.m. 3:30 p.m. 12 noon

(iii) Which one of the following statements is correct?
Circle your answer. [1]

A Robbie's average speed was greater between 8 a.m. and 9 a.m. than it was between 5 p.m. and 6 p.m.

B Robbie's average speed was the same between 8 a.m. and 9 a.m. as it was between 5 p.m. and 6 p.m.

C Robbie's average speed was less between 8 a.m. and 9 a.m. than it was between 5 p.m. and 6 p.m.

D It is not possible to tell anything about Robbie's average speed between 8 a.m. and 9 a.m. or between 5 p.m. and 6 p.m. from the information given.

(b) The travel graph shown is correct.
Robbie is 11 years old and tells his teacher,

'I walked to school, but actually had to run fast for the last 15 minutes to get there on time.'

'I didn't leave the school classroom all day'.

For each of Robbie's statements, decide whether he was telling the truth or not.
You must give a reason for each of your answers below:

(i) 'I walked to school but I ran for the last 15 minutes.'

Is this true? Put a tick in the box: Yes ☐ No ☐ [1]
Reason:

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(ii) 'I stayed in the classroom all day.'

Is this true? Put a tick in the box: Yes ☐ No ☐ [1]
Reason:

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7. Sam and Laura own $\frac{3}{4}$ of the company *Dragon CarCare*.

They each own $\frac{1}{2}$ of this $\frac{3}{4}$ share.

It cost a total of £8000 to set up the original business.
This set-up cost was paid in proportion to the share each person has in the business.
After 6 months, Laura received £3200 as her share of the profits so far.

Did Laura make a profit on her original investment or did she make a loss?

You must show all your working and state how much profit or loss Laura made.

[4]

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8. Hari lives in Chester.
He wanted to catch the ferry to Ireland, leaving Holyhead at 12:05 p.m.
Passengers must board the ferry at least 30 minutes before sailing time.

In planning his journey, he allowed himself 20 minutes to travel from the station at Holyhead to the ferry.
He wanted to catch the latest possible train from Chester to be sure of arriving on board the ferry in time.

Part of the train timetable he used is shown below.

Chester (depart)	07:19	08:55	09:58	10:24
Holyhead (arrival)	09:22	10:35	11:22	12:23

Hari caught the train he wanted, and the train arrived at Holyhead station on time.
The time to travel from the station to the ferry took a total of 25 minutes.

Calculate the total time taken between Hari departing from Chester and arriving at the ferry. [4]

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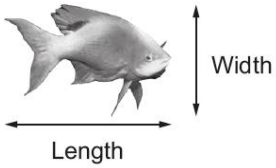
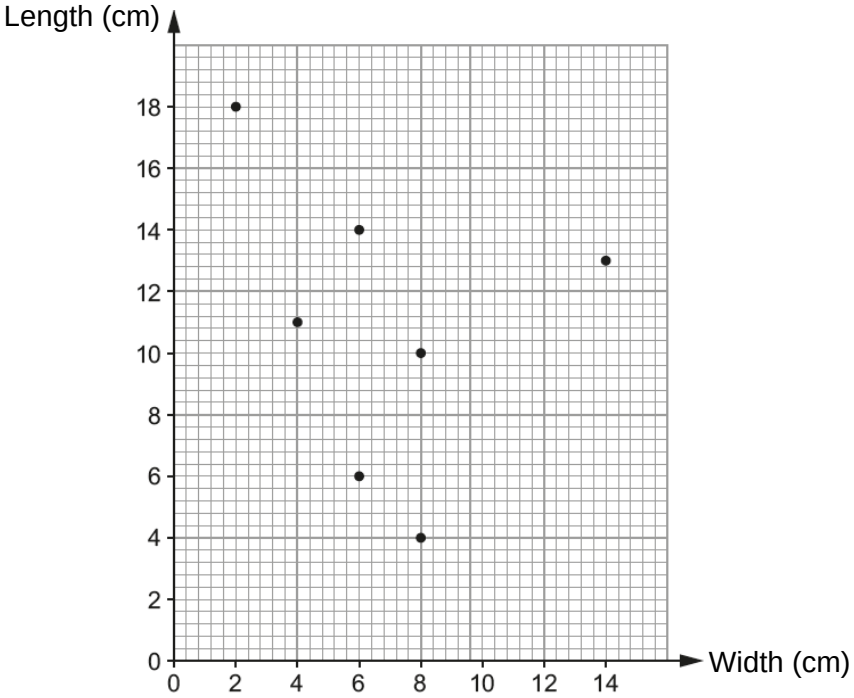
Time taken = ...

9. Nerys takes her 3 cousins, Ben, Elwyn and Denny, to an aquarium in North Wales.

(a) Denny records estimates for the length and width of some of the fish he sees at the aquarium.



He draws a scatter diagram as shown below.



(i) One of the fish is 4 cm wide.
Write down its length. [1]

…… cm

(ii) Another fish is 14 cm long.
Write down its width. [1]

…… cm

(iii) The width of a yellow fish is exactly the same as its length.
Indicate on the scatter diagram which point you think represents the yellow fish. [1]

(b)

Remember:

14 pounds = 1 stone
1 kg ≈ 2·2 pounds

Nerys sees a very big fish.

She is told it weighs 15 kg.

Nerys herself weighs 9 stone 4 pounds.

Complete the following sentence. [6]

Nerys weighs approximately …… times as much as the fish.

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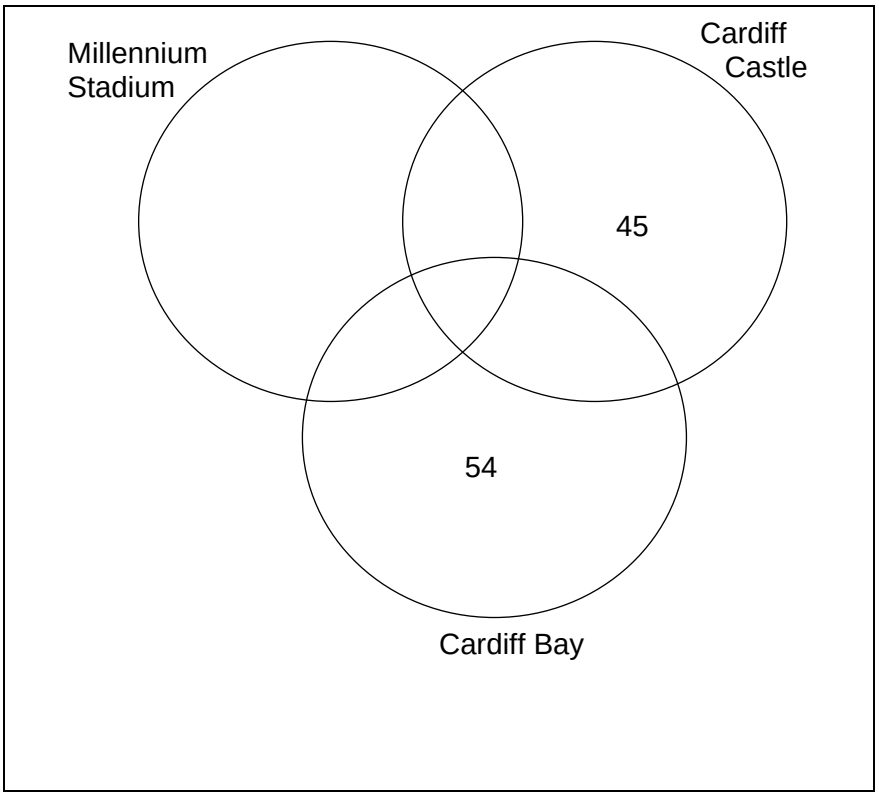
10. 200 visitors to Cardiff completed a questionnaire.

All 200 visitors had visited at least one of the following attractions: Cardiff Castle, the Millennium Stadium and Cardiff Bay.
25 of the visitors had visited Cardiff Castle and the Millennium Stadium and, of these, 15 had visited all three attractions.
91 of the visitors had visited the Millennium Stadium.
88 had visited Cardiff Castle.
101 had visited Cardiff Bay.
Some further information is given on the Venn diagram below.

How many visitors had visited the Millennium Stadium but not Cardiff Castle or Cardiff Bay? [5]



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……. visitors had visited the Millennium Stadium but not Cardiff Castle or Cardiff Bay.

Candidate Name	Centre Number					Candidate Number				
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GCSE

MATHEMATICS - NUMERACY

UNIT 2: CALCULATOR-ALLOWED
HIGHER TIER

SPECIMEN PAPER SUMMER 2017

1 HOUR 45 MINUTES

ADDITIONAL MATERIALS
A calculator will be required for this paper.
A ruler, protractor and a pair of compasses may be required.

INSTRUCTIONS TO CANDIDATES
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 in this booklet.

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.

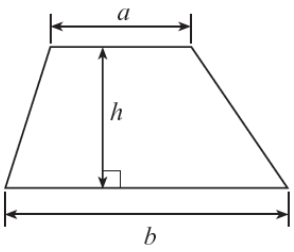
The number of marks is given in brackets at the end of each question or part-question.

The assessment will take into account the quality of your linguistic and mathematical organisation, communication and accuracy in writing in question **1**.

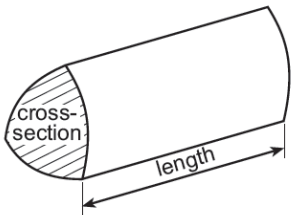
For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1.	**6**	
2.	**7**	
3.	**7**	
4.	**5**	
5.	**5**	
6.	**4**	
7.	**12**	
8.	**7**	
9.	**10**	
10.	**4**	
11	**13**	
TOTAL	**80**	

Formula list – Higher tier

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

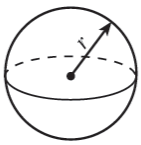


Volume of a prism = area of cross section × length



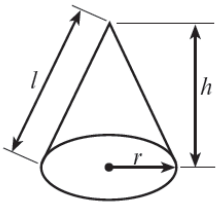
Volume of a sphere $= \frac{4}{3}\pi r^3$

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 $= \pi rl$

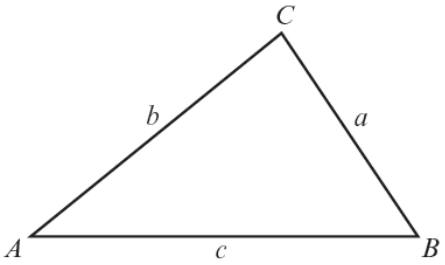


In any triangle *ABC*,

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 $a \neq 0$ are given by $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

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

Carys decides to invest £380 in a savings account for 6 years.
The account pays a rate of 2·54% AER.

Will Carys have sufficient money in her savings account to be able to buy a motor scooter costing £460 in 6 years' time?
You must show all your working and give a reason for your answer. [6]

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2. Layla is investigating how much people would be prepared to pay for a bottle of water at an Eisteddfod.

Amount of money (£x)	Number of people
$0 \leq x < 1$	12
$1 \leq x < 2$	44
$2 \leq x < 3$	20
$3 \leq x < 4$	4

She asked a number of people at a concert on Monday how much they would be prepared to pay.

Monday's results are summarised in the table.

(a) Calculate an estimate for the mean amount of money that a person would be prepared to pay for a bottle of water. [4]

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(b) Monday was a cool day.
On Tuesday, it was much warmer.
Layla asked a further 60 people the same question as she did on Monday.
On Tuesday, the mean was £2.30.

Use the data collected over the two days to calculate an estimate for the mean amount of money that a person would be prepared to pay for a bottle of water.
Give your answer correct to the nearest penny. [3]

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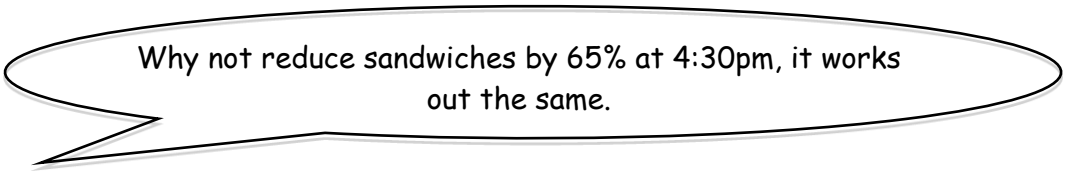
3. Jane and Tomos own a sandwich business.

(a) They decide to price sandwiches individually each morning.
At 3 p.m. any unsold sandwiches are reduced by 45%.
Any sandwiches still unsold by 4:30p.m. are reduced by a further 20%.

Jane says



Tomos disagrees with Jane.

Using multipliers, show that Jane is incorrect. [4]

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(b) Write down and simplify two formulae, in terms of P, to calculate the reduced prices of sandwiches at 3 p.m. and at 4:30 p.m.
Let

- P be the full price of the sandwich.
- T be the price of a sandwich at 3p.m.
- R be the price of a sandwich after 4:30p.m. [3]

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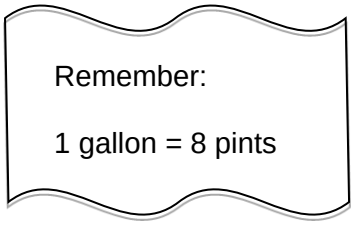

Lowri owns an old van.
It has an average fuel consumption of 7 km per litre.
Calculate an estimate for this fuel consumption in miles per gallon. [5]

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5. The diagram shows the route a dolphin swam from Port Quay to Rig Bay and then to Jay Cliff.

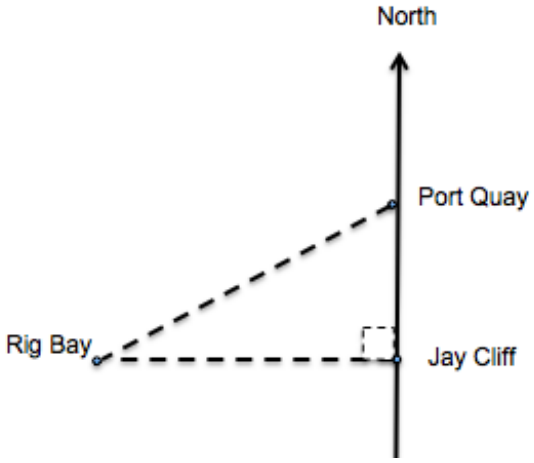

Diagram not drawn to scale

Rig Bay is on a bearing of 232° from Port Quay.
The distance from Port Quay to Rig Bay is 3·2 km.
Calculate how far the dolphin swam altogether [5]

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6. *NwyCymru* gas company uses the following formula to calculate how much to charge its customers:

charge (in pence) = (U × 11·546 + D × 31·48) × 1·05

The number of units of gas used by a customer is **U** and the number of days in the billing period is **D**.

A customer was charged £165.53 over a billing period of 90 days.
Calculate the number of gas units this customer used during this period. [4]

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7. *Pack4* is a company that makes cardboard boxes.

(a) One of their boxes, in the shape of a triangular prism, is shown below.

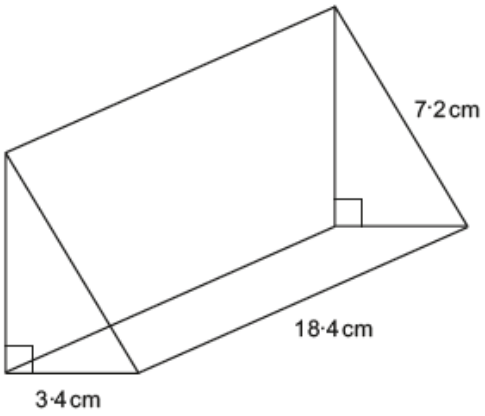

Diagram not drawn to scale

A customer wants a box with a volume of 0·2 litres.

(i) State by how much the volume is greater or less than 0·2 litres, giving your answer in cm^3 correct to 2 significant figures. [6]

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(ii) Explain why this may not be a suitable box for the customer. [1]

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(b) Another of the cardboard boxes made by *Pack4* is a cuboid.
The cuboid measures 3·4 cm by 2·6 cm by 6·8 cm, where all measurements are correct to the nearest 1 mm.
By what percentage does the greatest possible volume of this cuboid exceed the least possible volume? [5]

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8. The following table gives areas and populations of 6 countries.

Country	**Area (km^2)**	**Population in 2014**
Wales	20 761	3 006 000
Singapore	716	5 399 200
Bermuda	53	64 237
India	3 287 240	1 244 392 079
Belgium	30 528	11 194 824
Tonga	720	104 270

(a) How many times as dense is the country with the greatest population density as the country with the least population density?
You must show all your working. [4]

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(b) Which two countries have the same population densities to the nearest whole number of people per km^2? [1]
Circle your answer.

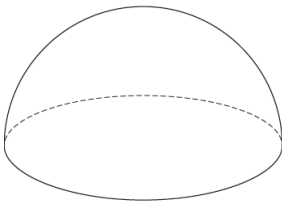
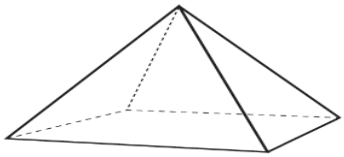
India and Belgium	Wales and Tonga	Singapore and Tonga	Wales and Belgium	Bermuda and Tonga

(c) If the information in the table had all been given correct to 2 significant figures would this make a difference to your answer in part *(a)*? [2]

Circle either TRUE or FALSE for each of the following statements.

No difference at all, the answer would be exactly the same.	TRUE	FALSE
One of the countries used in the comparison would be different.	TRUE	FALSE
Both countries used in the comparison would be different.	TRUE	FALSE
The only difference would be in rounding the final answer, nothing else in the calculation changes.	TRUE	FALSE
You cannot tell whether there would be a difference in the answer in part *(a)* if the information in the table had all been given correct to 2 significant figures.	TRUE	FALSE

9. *Blodyn Garden Products* makes caps for fence posts.

Solid metal fence caps	
	
Solid hemisphere cap	Solid pyramid cap

Blodyn Garden Products wants to make the price of the two different fence caps the same.
So it is important that the volume of metal used to make each cap is the same.

The lengths of the sides of the base of the pyramid are all 8 cm.
The angle between one of the sloping edges and the diagonal of the base is 32°.

(a) Calculate the height of the square-based pyramid cap. [5]

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(b) Calculate the volume of the square-based pyramid cap. [2]

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(c) Calculate the radius of the hemispherical fence cap. [3]

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10. *(a)* A School Council wants to know pupils' views on their school uniform.
Which of the following statements shows how a truly random sample of the general population can be obtained? [1]
Circle your answer.

A: Randomly selecting pupils in the canteen at lunchtime.

B: Randomly selecting pupils from those that attend the next School Council meeting.

C: Randomly selecting pupils with a surname beginning with the letter J.

D: Giving each pupil a raffle ticket and then randomly drawing raffle tickets for selection.

E: Selecting every 2nd pupil from each form register.

(b) *VotePredict* is a specialist company working in the field of polling and predicting voting patterns in elections worldwide.
They are asked to organise a debate with an audience that is representative of five political parties.
The five political parties and their predicted number of votes, given in alphabetical order, are as follows.

Political Party	Predicted votes
Central	23 456
Economy	43 244
First Reformists	83 124
Status Quest	11 782
West Term	63 789

The invited audience should be a stratified sample using this information.

It is intended to have 250 people in the audience at the debate.
How many people who intend to vote for the Central Party should be in the audience? [3]

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11. Imran works for a company called *Derwen Insurance.*
His gross salary is £47 840 per year.

Below are extracts from HM Revenue and Customs and details of Imran's company pension scheme:

National Insurance contributions
• If you earn more than **£153** a week and up to **£805** a week, you pay 12% of the amount you earn between **£153** and **£805** • If you earn more than **£805** a week, you also pay 2% of all your earnings over **£805**

Source: HMRC 2014

Income tax threshold and rates	
Income tax threshold	£10,000 per year
Basic tax rate	20% on annual earnings above income tax threshold and up to £31,865
Higher tax rate	40% on annual earnings from £31,866 to £150,000
Additional tax rate	45% on annual earnings above £150,000

Source: HMRC 2014

***Derwen Insurance* Pension Scheme**			
Gross salary	**Contribution rate**	**Gross salary**	**Contribution rate**
Up to £13 500	5·5%	**£60 001 to £85 000**	9·9%
£13 501 to £21 000	5·8%	**£85 001 to £100 000**	10·5%
£21 001 to £34 000	6·5%	**£100 001 to £150 000**	11·4%
£34 001 to £43 000	6·8%	**£150 001 or more**	12·5%
£43 001 to £60 000	8·5%		

Using the information on the previous page, calculate Imran's **weekly** net salary.
You must show all your working. [13]

Candidate Name	Centre Number					Candidate Number				
						0				

GCSE

MATHEMATICS - NUMERACY

UNIT 2: CALCULATOR-ALLOWED
INTERMEDIATE TIER

SPECIMEN PAPER SUMMER 2017

1 HOUR 45 MINUTES

ADDITIONAL MATERIALS
A calculator will be required for this paper.
A ruler, protractor and a pair of compasses may be required.

INSTRUCTIONS TO CANDIDATES
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 in this booklet.

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.

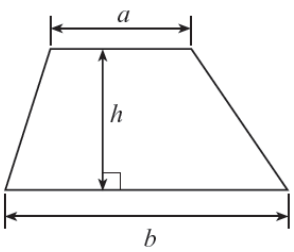
The number of marks is given in brackets at the end of each question or part-question.

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

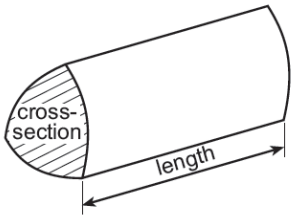
The assessment will take into account the quality of your linguistic and mathematical organisation, communication and accuracy in writing in question **5***(a)*.

Formula list

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



Volume of a prism = area of cross section × length



1.

	Grapes £3.40 per kg
	Bananas £2.70 per kg
	Apples £1.80 per kg

(a) The price of 1kg of bananas is due to be increased by either $\frac{1}{3}$ or 30%.

(i) How much would 1kg of bananas cost if the price was increased by $\frac{1}{3}$?
Circle your answer [1]

£4.05 £3.06 £3.60 £3.51 £2.97

(ii) How much would 1kg of bananas cost if the price was increased by 30%?
Circle your answer. [1]

£3.15 £10.80 £3.60 £3.51 £2.97

(b) The price of 1 kg of apples is to be reduced by $\frac{2}{5}$.
Calculate the new price of 1kg of apples. [2]

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(c) The price of peaches is not given in the table.
Rowena buys 0·4kg of grapes and 0·5kg of peaches.
It costs her £3.46 altogether.
What is the price of 1kg of peaches? [3]

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2. There were 32 rugby players in the 2013 – 2014 Wales rugby squad.
The mean height of these rugby players was 189 cm.

Circle either TRUE or FALSE for each of the following statements. [2]

All the rugby players in the squad must have been taller than 189 cm.	TRUE	FALSE
If there was a rugby player of height 191 cm in the squad, there must have been a rugby player of height 187 cm.	TRUE	FALSE
The majority of the rugby players in the squad must have been of height 189 cm.	TRUE	FALSE
If some of the rugby players in the squad were taller than 189 cm, then some must have been shorter than 189 cm.	TRUE	FALSE
Half the rugby players in the squad must have been shorter than 189 cm, and half of the rugby players in the squad must have been taller than 189 cm.	TRUE	FALSE

3. Siôn has gone to a travel agent to book a 7-day holiday at a Spanish resort for July 2016.

He has the following two **definite** requirements:

- He can only be away on holiday between 2 July 2016 and 23 July 2016.
- His flight must land in Malaga.

He would like to have as many as possible of the following four **preferred** conditions met:

- To fly from Cardiff Wales Airport.
- Depart on a Monday.
- Departure time to be before 10:00 a.m.
- The hotel to have a 3-star (***) rating.

Using the following information, choose the best two options from the eight holiday packages listed (Package A to Package H).
His definite requirements **must** be met and **as many as possible** of his preferred conditions should also be met. [4]

July 2016						
Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

Hotel	Star Rating
Castilla	* * *
Nou Sol	* * *
Costa Park	* *
Fiesta	* *

Package	Flights		Depart		Return		Hotel
	From	To	Date	Time	Date	Time	
A	Manchester	Malaga	11/7/16	14:00	18/7/16	23:00	*Castilla*
B	Manchester	Malaga	4/7/16	09:30	11/7/16	15:00	*Nou Sol*
C	Manchester	Malaga	5/7/16	06:30	12/7/16	15:00	*Costa Park*
D	Manchester	Seville	4/7/16	08:00	11/7/16	12:30	*Nou Sol*
E	Cardiff	Malaga	18/7/16	07:30	25/7/16	14:00	*Castilla*
F	Cardiff	Malaga	6/7/16	10:05	13/7/16	14:00	*Fiesta*
G	Cardiff	Malaga	11/7/16	17:00	18/7/16	22:00	*Castilla*
H	Cardiff	Malaga	9/7/16	09:45	16/7/13	05:30	*Costa Park*

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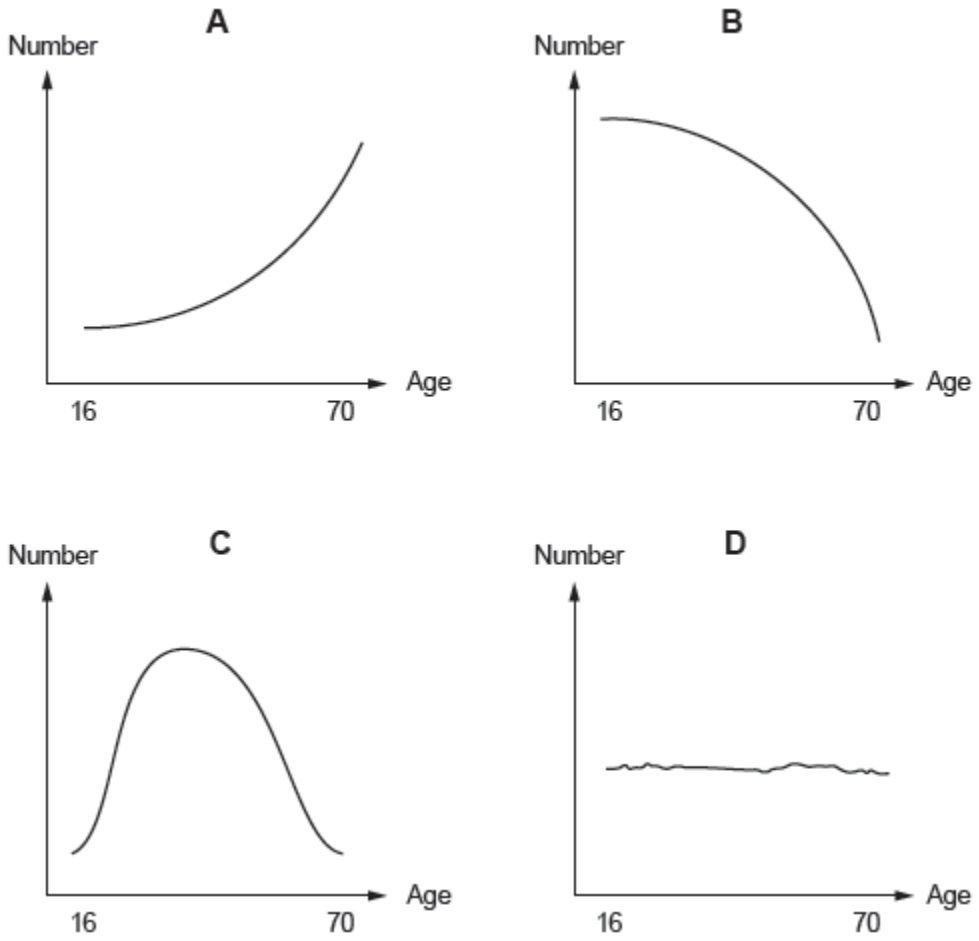
Allowing for as many of his preferred conditions as possible, the two best options for Siôn are:

Package …… and Package ……

4. Look at the four graphs labelled **A**, **B**, **C** and **D,** shown below.



Write down which graph **A**, **B**, **C** or **D**, in each case, is most likely to have the following titles.

[3]

‘The number of people in full-time employment.’ Graph .....

‘The number of people who play for a football team.’ Graph .....

‘The number of people who wear glasses.’ Graph .....

‘The number of people who are left-handed.’ Graph .....

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

Gemma bought a tablet last year for £240.
She sold it to a friend after a year for 35% less than she paid for it.

She sees a new tablet on sale for £365 with a special offer of '20% off'.
Gemma decides to use the money she has from selling her old tablet towards buying this new one.

How much extra will Gemma have to pay towards the new tablet using the special offer?
You must show all your working [8]

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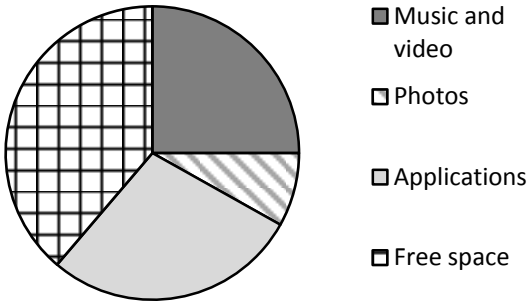
(b) Gemma's old tablet had a memory capacity of 16 GB.
Gemma stored music and videos, photos and applications on her tablet.
The table and pie chart below show the memory status of her 16 GB tablet.

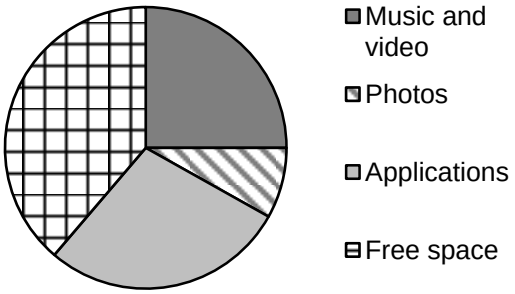
Music and videos	4 GB
Photos	1·3 GB
Applications	4·5 GB
Free space	6·2 GB



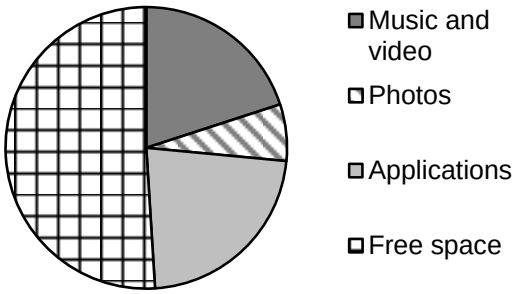
Gemma's new tablet has a memory capacity of 32 GB.
Gemma transfers the content of her old tablet to the new one.

Which one of the following graphs represents her new tablet's memory status? [1]
Circle **A**, **B**, **C** or **D**.

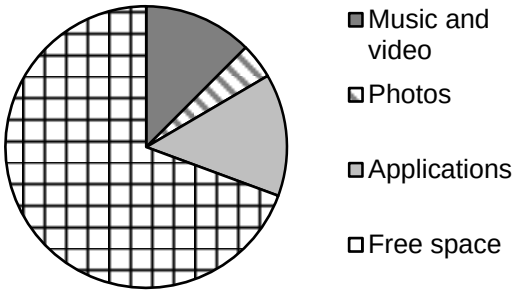
A



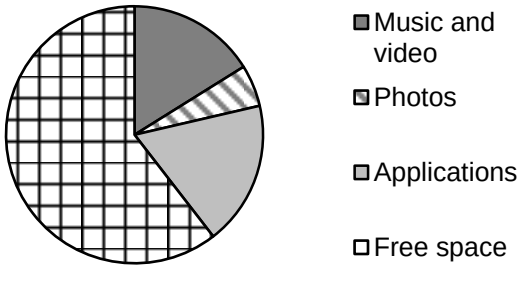
B



C



D



6. A plot of land labelled *ABCD* is shown below.
AB is parallel to *DC* and *BC* is perpendicular to *AB*.
AB = 100 metres and *DC* = 40 metres.

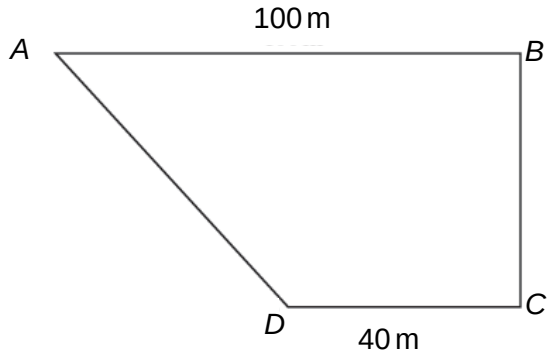


Diagram not drawn to scale

The area of this plot of land is 3500 m^2.
A cable is to be laid from point *B* to point *C*.
Calculate the length of this cable. [4]

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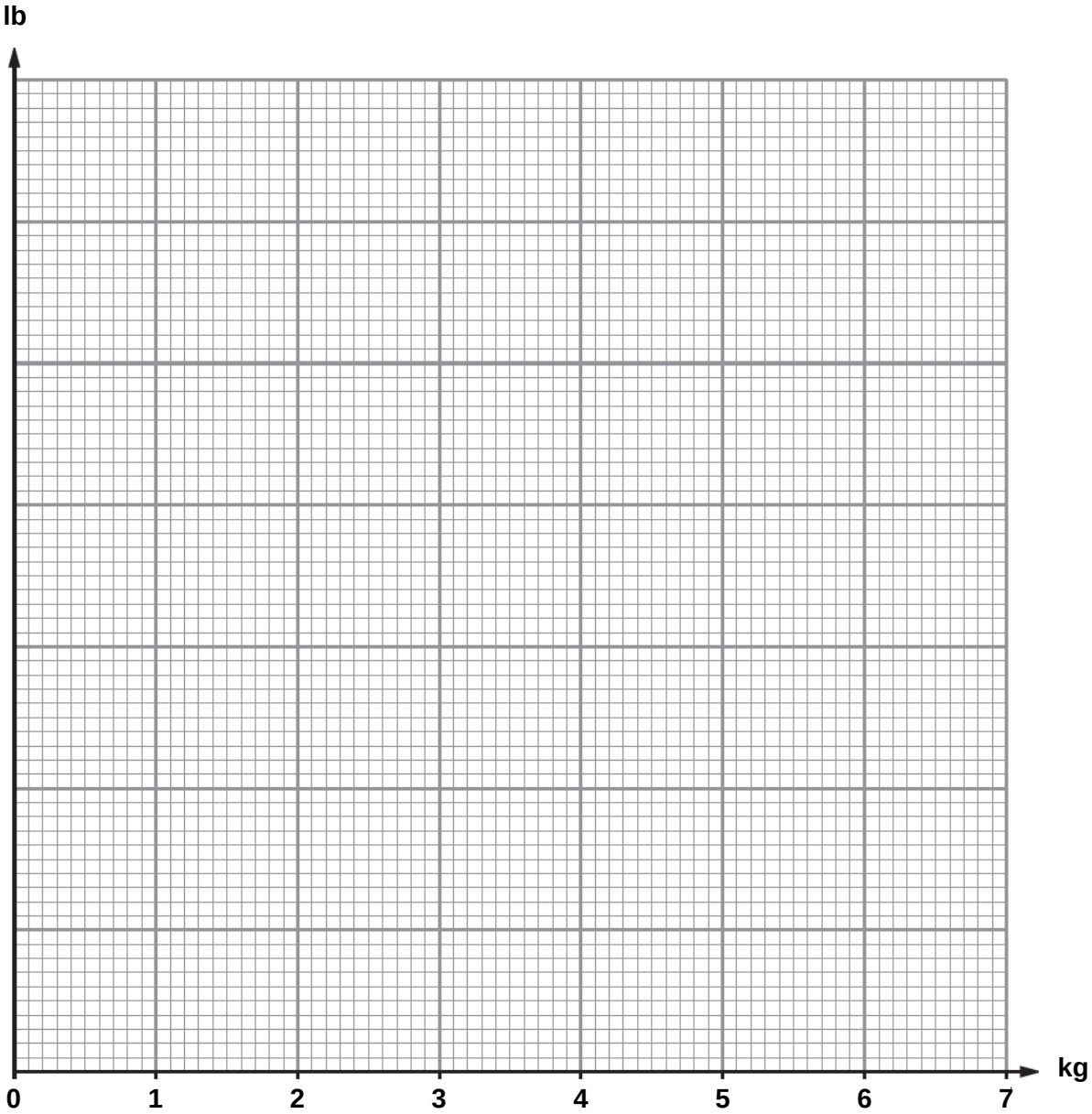
7. The following two pieces of information, given in both kilograms (kg) and pounds (lb), were seen in a cookery magazine.

Use 5 kg (11 lb) of apples. Wash and peel them.

Use 2 lb (0·9 kg) of sugar. Warm the sugar before use.

(a) Use the information to draw a conversion graph between kilograms and pounds. [3]



(b) A person weighs 10 stone. (1 stone = 14 lbs)
Use your graph to estimate the weight of this person in kilograms.
Remember to show the method you have used. [3]

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8. Caer Parc, Hawdon and Trebach are three bus stations.
Buses operate through the day, but no buses are timetabled to leave Caer Parc after 22:30.

Buses leave Caer Parc to Hawdon every 24 minutes.
Buses leave Caer Parc to Trebach every 18 minutes.

The first buses of the day from Caer Parc going to Hawdon and Trebach both leave at 06:00.

When is the last time that day that buses to Hawdon and Trebach both leave at the same time from Caer Parc? [6]

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9. Carys decides to invest £380 in a savings account for 6 years. The account pays a rate of 2·54% AER.

Will Carys have sufficient money in her savings account to be able to buy a motor scooter costing £460 in 6 years' time? You must show all your working and give a reason for your answer. [4]

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10. *Pack4* is a company that makes cardboard boxes.

(a) One of their boxes, in the shape of a triangular prism, is shown below.

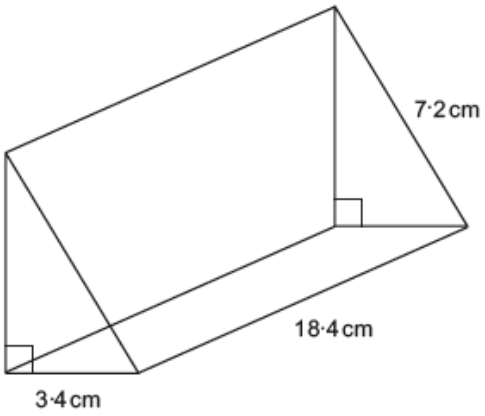

Diagram not drawn to scale

A customer wants a box with a volume of 0·2 litres.

State by how much the volume is greater or less than 0·2 litres, giving your answer in cm^3 correct to 2 significant figures. [6]

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(b) Explain why this may not be a suitable box for the customer. [1]

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11. Layla is investigating how much people would be prepared to pay for a bottle of water at an Eisteddfod.

Amount of money (£x)	Number of people
$0 \leq x < 1$	12
$1 \leq x < 2$	44
$2 \leq x < 3$	20
$3 \leq x < 4$	4

She asked a number of people at a concert on Monday how much they would be prepared to pay.

Monday's results are summarised in the table.

(a) Calculate an estimate for the mean amount of money that a person would be prepared to pay for a bottle of water. [4]

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(b) Monday was a cool day.
On Tuesday, it was much warmer.
Layla asked a further 60 people the same question as she did on Monday.
On Tuesday the mean was £2.30.

Use the data collected over the two days to calculate an estimate for the mean amount of money that a person would be prepared to pay for a bottle of water.
Give your answer correct to the nearest penny. [3]

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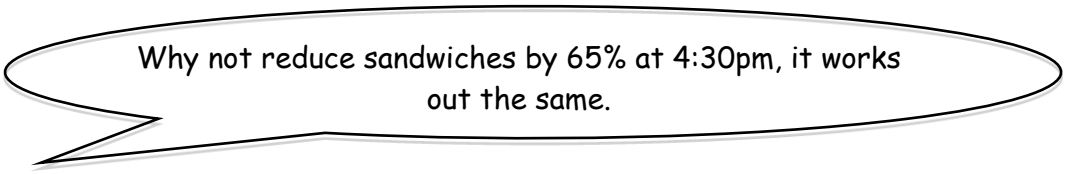
12. Jane and Tomos own a sandwich business.

(a) They decide to price sandwiches individually each morning.
At 3 p.m. any unsold sandwiches are reduced by 45%.
Any sandwiches still unsold by 4:30p.m. are reduced by a further 20%.

Jane says



Tomos disagrees with Jane.

Using multipliers, show that Jane is incorrect. [4]

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(b) Write down and simplify two formulae, in terms of P, to calculate the reduced prices of sandwiches at 3 p.m. and at 4:30 p.m.
Let

- P be the full price of the sandwich.
- T be the price of a sandwich at 3p.m.
- R be the price of a sandwich after 4:30p.m. [3]

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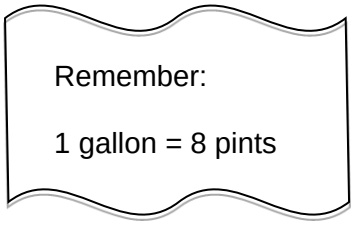

Lowri owns an old van.
It has an average fuel consumption of 7 km per litre.
Calculate an estimate for this fuel consumption in miles per gallon. [5]

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14. The diagram shows the route a dolphin swam from Port Quay to Rig Bay and then to Jay Cliff.

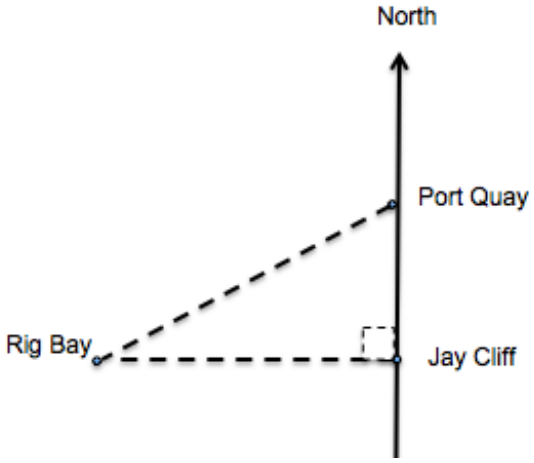

Diagram not drawn to scale

Rig Bay is on a bearing of 232° from Port Quay.
The distance from Port Quay to Rig Bay is 3·2 km.
Calculate how far the dolphin swam altogether [5]

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15. *NwyCymru* gas company uses the following formula to calculate how much to charge its customers:

charge (in pence) = (U × 11·546 + D × 31·48) × 1·05

The number of units of gas used by a customer is **U** and the number of days in the billing period is **D**.

A customer was charged £165.53 over a billing period of 90 days.
Calculate the number of gas units this customer used during this period. [4]

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Candidate Name	Centre Number					Candidate Number				
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GCSE

MATHEMATICS - NUMERACY

UNIT 2: CALCULATOR-ALLOWED
FOUNDATION TIER

SPECIMEN PAPER SUMMER 2017

1 HOUR 30 MINUTES

ADDITIONAL MATERIALS
A calculator will be required for this paper.
A ruler, protractor and a pair of compasses may be required.

INSTRUCTIONS TO CANDIDATES
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 in this booklet.

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.

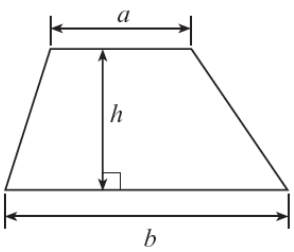
For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1.	**7**	
2.	**3**	
3.	**6**	
4.	**4**	
5.	**5**	
6.	**7**	
7.	**7**	
8.	**2**	
9.	**4**	
10.	**3**	
11.	**7**	
12.	**4**	
13.	**6**	
TOTAL	**65**	

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

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

Formula list

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



1. Nicole is planning a charity bike ride.

Nicole has to buy some new equipment so that she can take part in the bike ride. She sees the following items on the Internet.

Pair of Shorts £40.50 	Pair of Gloves £22.49 	Water Bottle £6.12 
Pair of Shoes £79.95 	Helmet £56.50 	Sunglasses £20.79 

(a) Nicole buys a pair of gloves, 3 water bottles, a pair of shoes and 2 pairs of shorts.
Complete the following table to show her bill for these items. [4]

Item	**Cost**
Pair of gloves	£22.49
3 water bottles	
Pair of shoes	
2 pairs of shorts	
Total	£

(b) The Internet company gives Nicole a 5% discount off her total bill.
How much does Nicole pay for her items after the discount has been given? [3]

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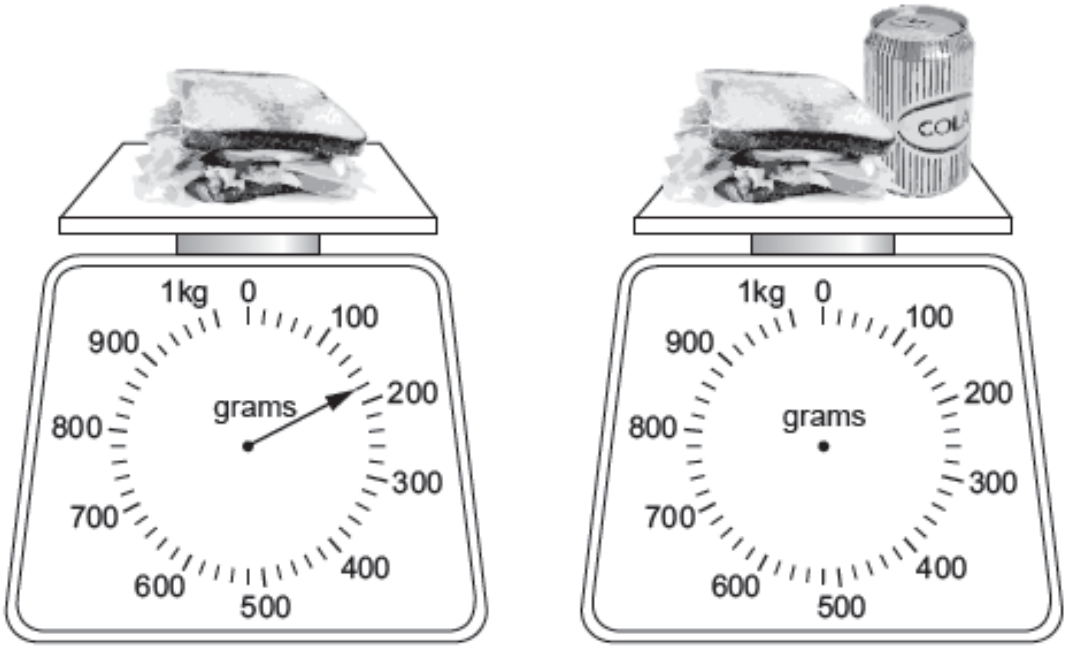
2. Rhys decides to weigh his packed lunch.
The pointer on the first scale shows the weight of his sandwich.
His drink weighs 350 grams.
Draw a pointer on the second scale to show the total weight of his sandwich and his drink. [3]



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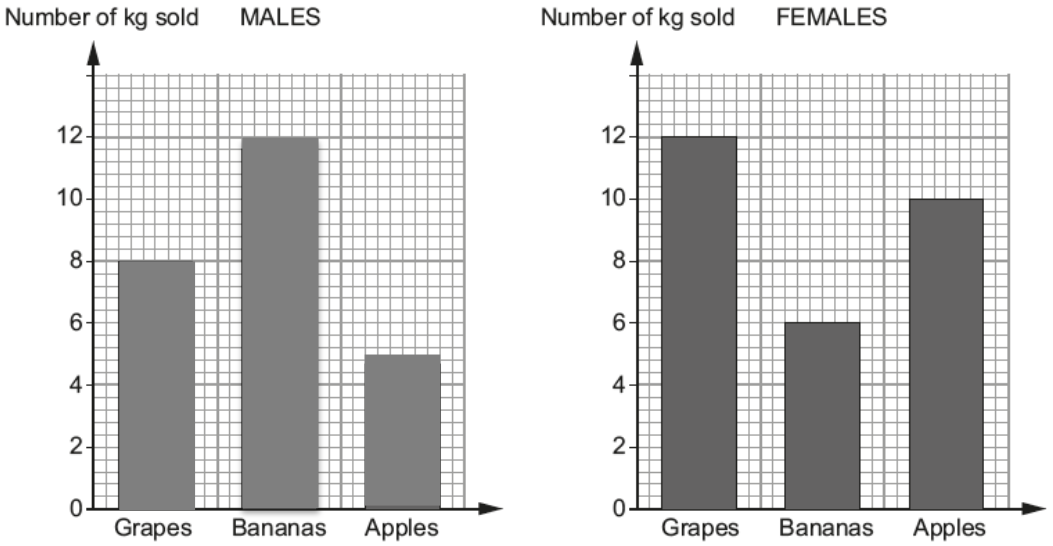
3. A fruit shop owner is looking at the buying habits of male and female customers. The bar charts show the quantity of fruit sold, in kg, to males and to females separately last Tuesday.



(a) Complete the statements below about the fruit sold last Tuesday. [3]

The total weight of apples sold is …… kg.

The total weight of grapes, bananas and apples sold to females is …… kg.

Females bought …… kg more grapes than males.

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(b) (i) The owner says that the most popular fruit is bananas.
She is incorrect.
What may have misled the owner to say this? [1]

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(ii) Use the graphs, showing your calculations, to convince the owner that she is incorrect. [2]

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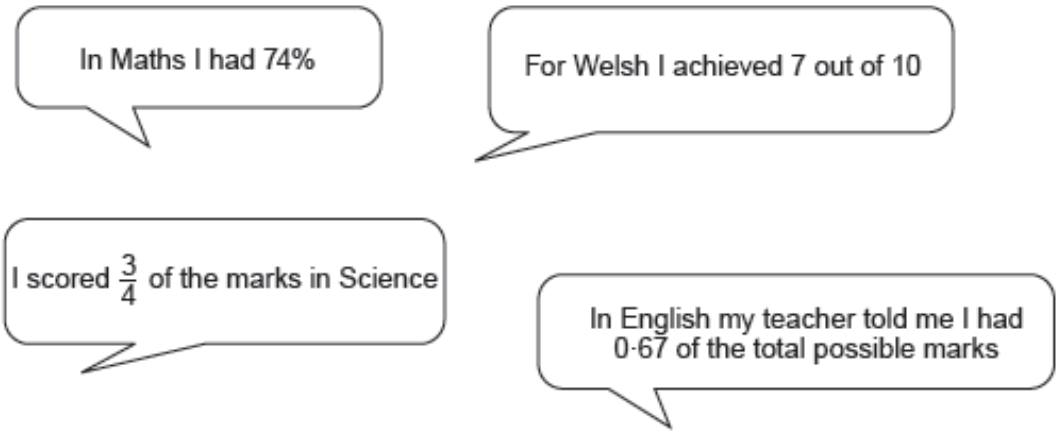
4. At the end of term, Jac had tests in four of his subjects.
This is what he said about his results



(a) For Jac to compare all of his results he needs to write them as percentages.
Change his results into percentages and complete the table below. [3]

Subject	Result as a percentage
Mathematics	74%
Welsh	
Science	
English	

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(b) In which subject did Jac have the highest percentage? [1]

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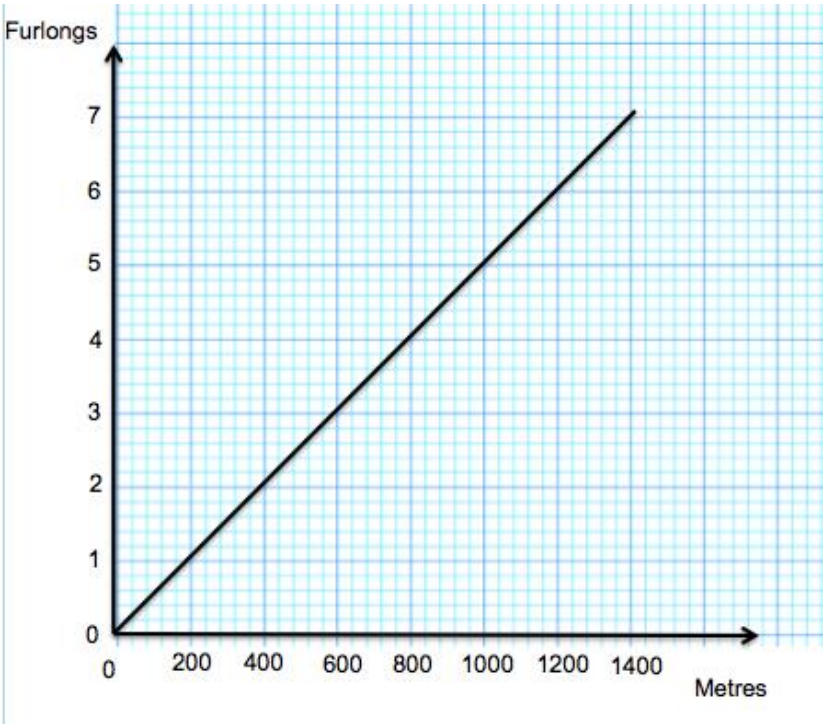
5. Horse-racing tracks are often measured in furlongs.
The conversion graph below shows furlongs and metres.



(a) Complete the following statements. [3]

A track measuring 6 furlongs is approximately …… metres.

A track measuring 4·5 furlongs is approximately …… metres.

A track measuring 300 metres is approximately …… furlongs.

(b) Harry needs to know the length, in metres, of a 10-furlong track.
How can the conversion graph be used to help Harry find an answer?
You must explain any calculations and give an answer. [2]

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10 furlongs is approximately …… metres

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

A gardener wishes to place new fencing around his rectangular vegetable garden.

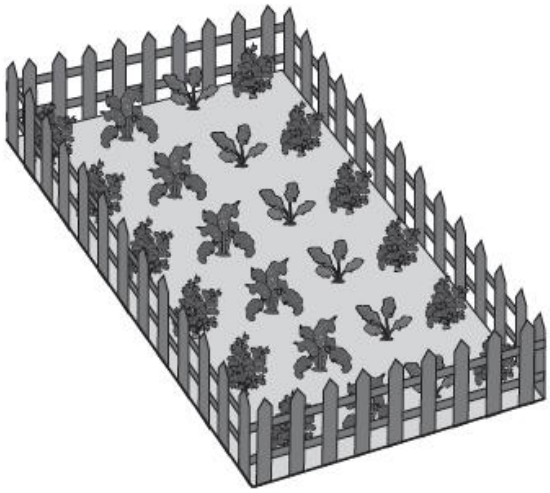

Diagram not drawn to scale

The garden is 12 metres long and 9 metres wide.
Each fence panel is 3 metres long and costs £21.98.
Find the total cost of the fence panels for the rectangular vegetable garden.
You must show all your working. [7]

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7.

	Grapes £3.40 per kg
	Bananas £2.70 per kg
	Apples £1.80 per kg

(a) The price of 1kg of bananas is due to be increased by either $\frac{1}{3}$ or 30%.

(i) How much would 1kg of bananas cost if the price was increased by $\frac{1}{3}$?
Circle your answer [1]

£4.05 £3.06 £3.60 £3.51 £2.97

(ii) How much would 1kg of bananas cost if the price was increased by 30%?
Circle your answer. [1]

£3.15 £10.80 £3.60 £3.51 £2.97

(b) The price of 1 kg of apples is to be reduced by $\frac{2}{5}$.

Calculate the new price of 1kg of apples. [2]

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(c) The price of peaches is not given in the table.
Rowena buys 0·4kg of grapes and 0·5kg of peaches.
It costs her £3.46 altogether.
What is the price of 1kg of peaches? [3]

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8. There were 32 rugby players in the 2013-2014 Wales rugby squad.
The mean height of these rugby players was 189 cm.

Circle either TRUE or FALSE for each of the following statements. [2]

All the rugby players in the squad must have been taller than 189 cm.	TRUE	FALSE
If there was a rugby player of height 191 cm in the squad, there must have been a rugby player of height 187 cm.	TRUE	FALSE
The majority of the rugby players in the squad must have been of height 189 cm.	TRUE	FALSE
If some of the rugby players in the squad were taller than 189 cm, then some must have been shorter than 189 cm.	TRUE	FALSE
Half the rugby players in the squad must have been shorter than 189 cm, and half of the rugby players in the squad must have been taller than 189 cm.	TRUE	FALSE

9. Siôn has gone to a travel agent to book a 7-day holiday at a Spanish resort for July 2016.

He has the following two **definite** requirements:

- He can only be away on holiday between 2 July 2016 and 23 July 2016.
- His flight must land in Malaga.

He would like to have as many as possible of the following four **preferred** conditions met:

- To fly from Cardiff Wales Airport.
- Depart on a Monday.
- Departure time to be before 10:00 a.m.
- The hotel to have a 3-star (***) rating.

Using the following information, choose the best two options from the eight holiday packages listed (Package A to Package H).
His definite requirements **must** be met and **as many as possible** of his preferred conditions should also be met. [4]

July 2016						
Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

Hotel	Star Rating
Castilla	* * *
Nou Sol	* * *
Costa Park	* *
Fiesta	* *

Package	Flights		Depart		Return		Hotel
	From	To	Date	Time	Date	Time	
A	Manchester	Malaga	11/7/16	14:00	18/7/16	23:00	*Castilla*
B	Manchester	Malaga	4/7/16	09:30	11/7/16	15:00	*Nou Sol*
C	Manchester	Malaga	5/7/16	06:30	12/7/16	15:00	*Costa Park*
D	Manchester	Seville	4/7/16	08:00	11/7/16	12:30	*Nou Sol*
E	Cardiff	Malaga	18/7/16	07:30	25/7/16	14:00	*Castilla*
F	Cardiff	Malaga	6/7/16	10:05	13/7/16	14:00	*Fiesta*
G	Cardiff	Malaga	11/7/16	17:00	18/7/16	22:00	*Castilla*
H	Cardiff	Malaga	9/7/16	09:45	16/7/13	05:30	*Costa Park*

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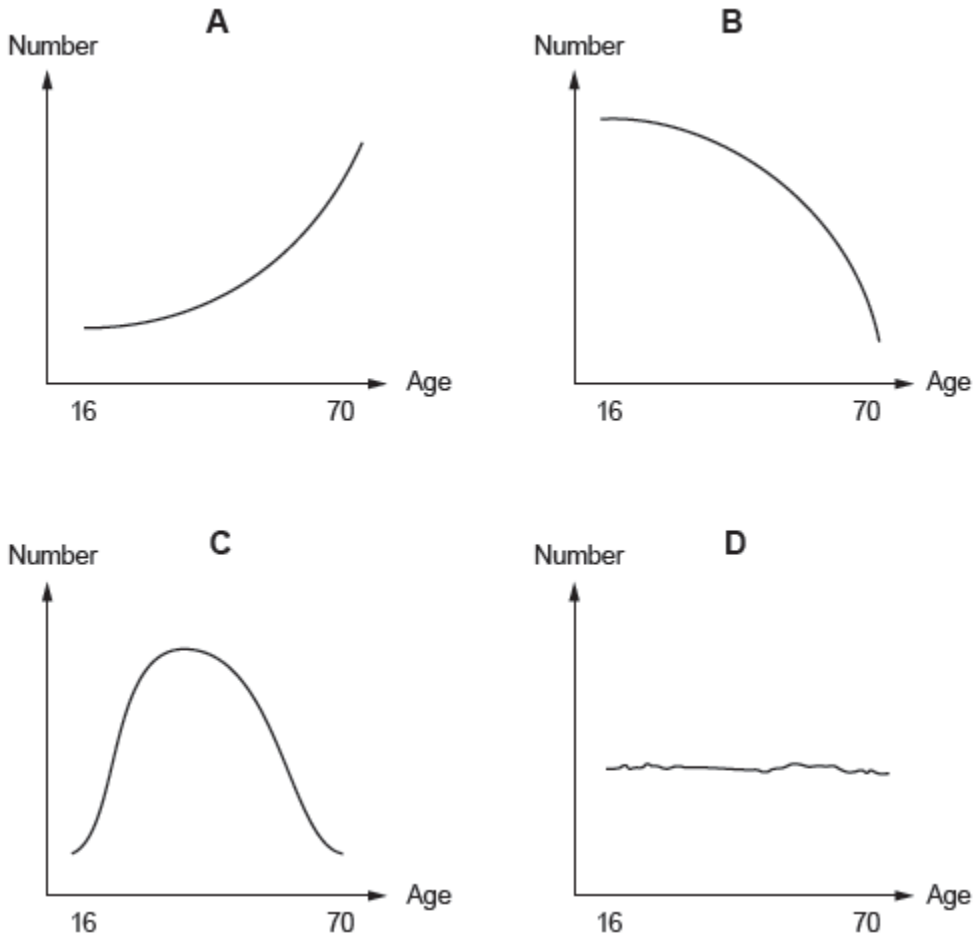
Allowing for as many of his preferred conditions as possible, the two best options for Siôn are:

Package …… and Package ……

10. Look at the four graphs labelled **A**, **B**, **C** and **D,** shown below.



Write down which graph **A**, **B**, **C** or **D**, in each case, is most likely to have the following titles.

[3]

‘The number of people in full-time employment.’ Graph .....

‘The number of people who play for a football team.’ Graph .....

‘The number of people who wear glasses.’ Graph .....

‘The number of people who are left-handed.’ Graph .....

11. *(a)* Gemma bought a tablet last year for £240.
She sold it to a friend after a year for 35% less than she paid for it.

She sees a new tablet on sale for £365 with a special offer of '20% off'.
Gemma decides to use the money she has from selling her old tablet towards buying this new one.

How much extra will Gemma have to pay towards the new tablet using the special offer?
You must show all your working [6]

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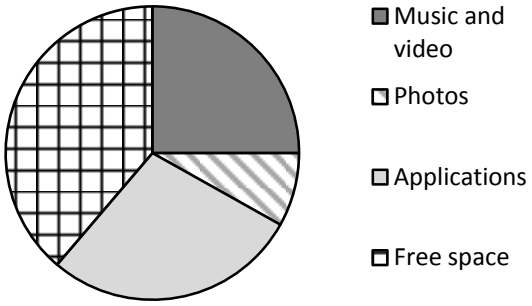
(b) Gemma's old tablet had a memory capacity of 16 GB.
Gemma stored music and videos, photos and applications on her tablet.
The table and pie chart below show the memory status of her 16 GB tablet.

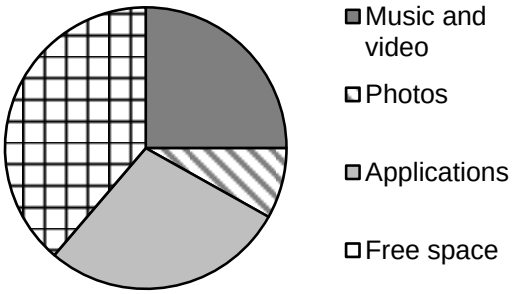
Music and videos	4 GB
Photos	1·3 GB
Applications	4·5 GB
Free space	6·2 GB



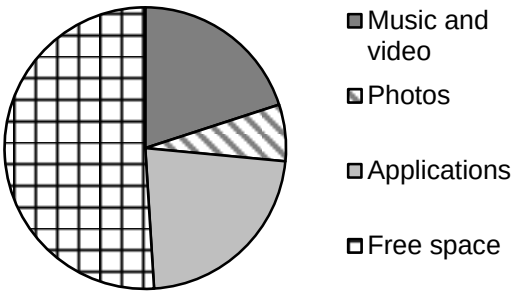
Gemma's new tablet has a memory capacity of 32 GB.
Gemma transfers the content of her old tablet to the new one.

Which one of the following graphs represents her new tablet's memory status? [1]
Circle **A**, **B**, **C** or **D**.

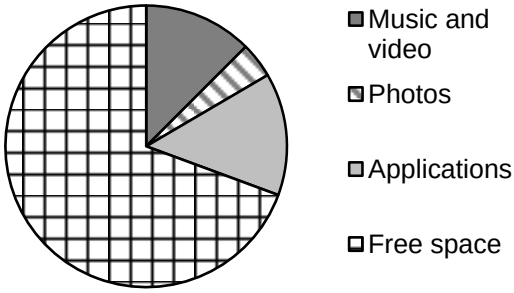
A



B



C



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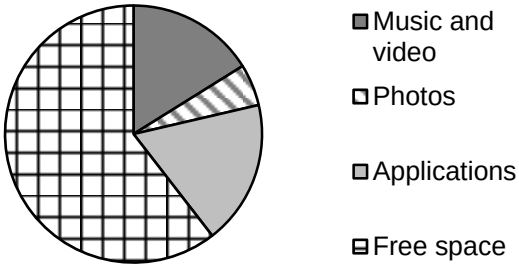

12. A plot of land labelled *ABCD* is shown below.
AB is parallel to *DC* and *BC* is perpendicular to *AB*.
AB = 100 metres and *DC* = 40 metres.

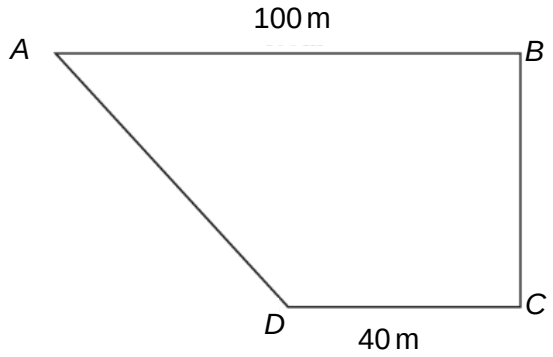

Diagram not drawn to scale

The area of this plot of land is 3500 m^2.
A cable is to be laid from point *B* to point *C*.
Calculate the length of this cable. [4]

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13. Caer Parc, Hawdon and Trebach are three bus stations.
Buses operate through the day, but no buses are timetabled to leave Caer Parc after 22:30.

Buses leave Caer Parc to Hawdon every 24 minutes.
Buses leave Caer Parc to Trebach every 18 minutes.

The first buses of the day from Caer Parc going to Hawdon and Trebach both leave at 06:00.

When is the last time that day that buses to Hawdon and Trebach both leave at the same time from Caer Parc? [6]

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MARKING SCHEMES

UNIT 1: NON-CALCULATOR, HIGHER TIER
GENERAL INSTRUCTIONS for MARKING GCSE Mathematics - Numeracy

1. The mark scheme should be applied precisely and no departure made from it. Marks should be awarded directly as indicated and no further subdivision made.

2. Marking Abbreviations

The following may be used in marking schemes or in the marking of scripts to indicate reasons for the marks awarded.

cao = correct answer only
MR = misread
PA = premature approximation
bod = benefit of doubt
oe = or equivalent
si = seen or implied
ISW = ignore subsequent working

F.T. = follow through ($\surd$ indicates correct working following an error and $\not\surd$ indicates a further error has been made)

Anything given in brackets in the marking scheme is expected but, not required, to gain credit.

3. Premature Approximation

A candidate who approximates prematurely and then proceeds correctly to a final answer loses 1 mark as directed by the Principal Examiner.

4. Misreads

When the data of a question is misread in such a way as not to alter the aim or difficulty of a question, follow through the working and allot marks for the candidates' answers as on the scheme using the new data.
This is only applicable if a wrong value, is used consistently throughout a solution; if the correct value appears anywhere, the solution is not classed as MR (but may, of course, still earn other marks).

5. Marking codes

- 'M' marks are awarded for any correct method applied to appropriate working, even though a numerical error may be involved. Once earned they cannot be lost.
- 'm' marks are dependant method marks. They are only given if the relevant previous 'M' mark has been earned.
- 'A' marks are given for a numerically correct stage, for a correct result or for an answer lying within a specified range. They are only given if the relevant M/m mark has been earned either explicitly or by inference from the correct answer.
- 'B' marks are independent of method and are usually awarded for an accurate result or statement.
- 'S' marks are awarded for strategy
- 'E' marks are awarded for explanation
- 'U' marks are awarded for units
- 'P' marks are awarded for plotting points
- 'C' marks are awarded for drawing curves

UNIT 1: NON-CALCULATOR, HIGHER TIER

GCSE Mathematics – Numeracy Unit 1: Higher Tier	Mark	Comment
1. Perpendicular bisector Stornaway and Ullapool (±2°) Use of correct scale (1cm = 10 miles) Arc from Portree 30 miles shown as approximately 3× distance Muir to Dingwell (i.e. 3cm) Free hand distance 10 miles off shore (i.e. 1cm) Indication of possible sightings Range of bearing ±2°	B1 B1 B1 B1 B1 B2 7	 Award for use of 3cm in arc or 1cm in free hand drawing below FT their Muir to Dingwall distance FT for attempted perpendicular and arc only FT provided at least B2 previously awarded B1 for any 1 bearing within the correct range
2.(a) Area of ends: 10×1 + 10×3 Area of the floor: 20.1×10 Vertical sides with slopes: ½×20×(1+3) × 2 Total surface area of 5 faces: 10×1 + 10×3 + 20.1×10 + 2 ×½×20×(1+3) (10 + 30 + 201 + 80 or 10 + 30 + 201 + 40 + 40=) 321 (m^2) Total cost £ 321 × 20 + 6 × 150 (£)7320 2(b)(i) >£140: with pool 120 – 105 (=15) AND without pool 120 – 115 (=5) 10 (hotels) (ii) [table] Interpretation must refer to the greater spread AND greater median of prices in hotels with a pool or equivalent e.g. The prices are generally lower and less varied in hotels without pools.	B1 B1 B1 M1 A2 M1 A1 M1 A1 B3 E1 14	 May be seen with a calculation ×£25 FT their 5 faces provided at least B2 previously awarded. A1 for at least 3 areas accurately evaluated in a sum of areas of 5 sides FT 'their derived 321' Medians and IQRs correct B2 for any 3 of the 4 correct B1 for any 1 or 2 of the 4 correct Depends on previous award of at least B2
3.(a) £1 coin (b) 8×10^{-3} (c) 307 (d) 3860 ÷ 200 19.3 (g/cm^3)	B1 B1 B1 M2 A1 6	 M1 for digits 3860 divided by 200 with incorrect place value
4. 4 × ⅓ or equivalent × 2½ or equivalent. = 20/6(hrs) or equivalent OR 200(min) = 3hrs 20 min.	M1 M1 A1 A1 4	 Do not accept 20 ÷ 6. F.T. if at least one M1 and of equivalent difficulty. *If question is misread as 'It took Machine **A** 4 hours .....How long did it take Machine **B**.....?'* *Award SC1 for (4 × 3) / 2½ or 4·8 hours and a further SC1 for 4hrs 48min.*

	Median (£)	IQR (£)
With pool	108	(130 – 74 =) 56
Without pool	74	(90 – 66 =) 24

GCSE Mathematics – Numeracy Unit 1: Higher Tier	Mark	Comment
5.(a) ¼ or equivalent (b) TRUE FALSE TRUE TRUE FALSE	B1 B2 3	 B1 for any 4 correct
6.(a)(i) (800 – 300)/ 50 = 10 (ii) Explanation, e.g. 'extra cost per person', '£10 per person', '£100 extra for every 10 people' (iii) Explanation, e.g. 'fixed charge' (b) (£)200	M1 A1 E1 E1 B1 5	Or equivalent Do not accept 'more people the more paid' FT from their gradient if reasonable Accept 'conference cost starts at £300', or 'hire cost' CAO
7.(a) Using ratio 30 : 1 or equivalent. (Ratio of areas =) 900 : 1 or equivalent. (Area of large logo =) 5 × 900 (= 4500cm^2) (Cost =) (£)200 × 0·45 (£) 90 Organisation and communication Accuracy of writing (b)(i) Perimeter = a - 5b + 2c - d (ii) Area = a(5b + 2c – d)	B1 M1 m1 m1 A1 OC1 W1 B1 B1 9	 Allow M1 for sight of 270 : 9 or equivalent notation. F.T. '(their length ratio)^2'.
8. (a) Tangent at t = 30 Use of difference in v / difference in t Acceleration …… (reasonable for their tangent) m/s^2 or ms^{-2} (b) Use of area under the curve from 0 to 30 seconds Correct method, including ½×4×30 or ½×5×30 Correct answer to calculation, e.g. 60(m) to 75(m)	M1 M1 A1 U1 S1 M1 A1 7	 Accept with or without sight of a tangent Must be evaluated from their tangent Independent *Treat area 0 to 50 seconds as MR-1 then FT* Accept any suitable calculation for 1 or more blocks of area If units are given they must be correct *Trapezium rule (approximate values)* *10×[0+4.4+2(1.75+3.4)]/2 =73.5(m)*
9. (a)Frequency density = 1 indicated on graph (b) FALSE TRUE FALSE FALSE FALSE (c) Total number of pupils: 5×2 + 14×0.5 + 10×0.5 + 6×1 + 4×1 + 1×2 34 5 to 7 seconds total number: (14×0.5 + 10×0.5 + 6×1 =) 18 Convincing 60% of 34 = 20.4 which is > 18 or 18 is 60% of 30, so it's less than 60% of 34.	B2 B2 M1 A1 B1 B1 8	B1 for sight of 1 or 2 ÷ 2 B1 for 4 correct (10 + 7 + 5 + 6 + 4 + 2) FT provided at least 2 of the 3 correct FT provided similar difficulty *Alternative method* *18/34 ≈ 0.529… or 52.9% <60%*

GCSE Mathematics – Numeracy Unit 1: Higher Tier	Mark	Comment
10. (£)120 × 1·2 (£)144 (£)144 ÷ 0·75 or equivalent (£)192	 M1 A1 M1 A1 4	 FT 'their (£)144'
11.(a) (i) ¾ × 28 × (£) 8 (million) × 1.1 (£) 184.8 million or equivalent (ii) £1 × 10^8	M1 m1 A1 B1	
(b)(i) M25 1/5 longer than M62 or equivalent	M1	Decide on reasonable comparison
e.g. (1960-1976) $7.7x10^8$×6/5 (for approximately same length of M25) 9(.24) x10^8	M1 A1	Method calculation (with approximations) for comparison Accurate calculation (with approximations)
Conclusion, e.g. 'very similar cost per mile'	E1	Accept a conclusion that there was a decrease in costs e.g. No, there was a decrease of about £33 000 per mile
(b)(ii) Decision, e.g. to estimate an average cost for a vehicle for the period, e.g. car £4, lorry £10	S1	
Reasonable accurate calculation for toll fees for 1 day, e.g. 20 000×4 + 19 000×10 = (£) 270 000 (per day)	B1	
Build cost ÷ toll fee taken per day (may include approximation) 900 000 000 ÷ 270 000 (≈ 3300) OR 900 000 000 ÷ 300 000 (=3000) ÷365 (or approximation of the days in a year, e.g. 300 or 350) (3300÷365 ≈ 9 years) (3000÷300 = 10 years) Accept **answers between 8 to 11 years** from reasonable approximations and accurate calculations (may be approximations) **AND** assumptions/approximations/estimates have been clear in working.	M1 m1 A1 13	 OR Build cost ÷ toll fee taken per month OR ÷12 (when working in months) Additional assumptions may include that the costs given are able to be compared or that comparable effects of inflation are being overlooked etc. *Additional method* *Daily revenue in 2003* *= 20000 × 2 + 19000×10 = (£)239000* *Number of days = $9×10^8$ ÷239000 ≈ 4000 days, i.e. about 11 years* *Daily revenue in 2012* *= 20000 × 5.5 + 19000×11 = (£)319000* *Number of days = $9×10^8$ ÷319000 ≈ 3000 days, i.e. about 8 years* *So, it will take between 8 years and 11 years to recover the costs, so about 10 years*

UNIT 1: NON-CALCULATOR, INTERMEDIATE TIER
GENERAL INSTRUCTIONS for MARKING GCSE Mathematics - Numeracy

1. The mark scheme should be applied precisely and no departure made from it. Marks should be awarded directly as indicated and no further subdivision made.

2. Marking Abbreviations

The following may be used in marking schemes or in the marking of scripts to indicate reasons for the marks awarded.

cao = correct answer only
MR = misread
PA = premature approximation
bod = benefit of doubt
oe = or equivalent
si = seen or implied
ISW = ignore subsequent working

F.T. = follow through ($\surd$ indicates correct working following an error and $\not\surd$ indicates a further error has been made)

Anything given in brackets in the marking scheme is expected but, not required, to gain credit.

3. Premature Approximation

A candidate who approximates prematurely and then proceeds correctly to a final answer loses 1 mark as directed by the Principal Examiner.

4. Misreads

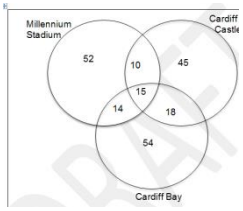
When the data of a question is misread in such a way as not to alter the aim or difficulty of a question, follow through the working and allot marks for the candidates' answers as on the scheme using the new data.
This is only applicable if a wrong value, is used consistently throughout a solution; if the correct value appears anywhere, the solution is not classed as MR (but may, of course, still earn other marks).

5. Marking codes

- 'M' marks are awarded for any correct method applied to appropriate working, even though a numerical error may be involved. Once earned they cannot be lost.
- 'm' marks are dependant method marks. They are only given if the relevant previous 'M' mark has been earned.
- 'A' marks are given for a numerically correct stage, for a correct result or for an answer lying within a specified range. They are only given if the relevant M/m mark has been earned either explicitly or by inference from the correct answer.
- 'B' marks are independent of method and are usually awarded for an accurate result or statement.
- 'S' marks are awarded for strategy
- 'E' marks are awarded for explanation
- 'U' marks are awarded for units
- 'P' marks are awarded for plotting points
- 'C' marks are awarded for drawing curves

UNIT 1: NON-CALCULATOR, INTERMEDIATE TIER

GCSE Mathematics – Numeracy Unit 1: Intermediate Tier	Mark	Comment
1. Lines of length 6·5cm AND 5cm. Angle of turn 37° 1090 metres or equivalent	 B1 B1 B2 4	*Allow ± 2mm and ± 2°.* F.T. 'their length from start'× 100. Correct units must be given B1 for correct length without units. B1 for length only <u>with incorrect units</u> (e.g. 10·9cm or 11cm)
2.(a) (i) 9:00 a.m. (ii) 12:30 p.m. (iii) A (b)(i) States or implies NO with a reason, e.g. 'No, the slope is the same from 8am to 9am' (ii)States or implies NO with a reason, e.g. 'No, the graph shows a further distance away from home between 12 noon and 1 p.m.'	B1 B1 B1 E1 E1 5	
3.(a) Car Wash (£)12 + Window (£)16 + Wax (£)15 + Cloths (£)20 (£) 63 (b) Water: 500 × (£)2 + (£)4 (= £1004) Electricity: 800 × 25(p)+ (£)10 Electricity VAT (£)210× 5/100 (+210) Total (£)1224.5(0) (c) (£)1287.5(0)	M2 A1 M1 M1 m1 A1 B1 8	M1 any 2 correct in a sum of at least 3 products CAO (£220.50) (Services 1004 + 220.50) CAO FT their total provided M1, M1, m1 awarded
4. (Laura's share=) ½ × ¾ × (£)8000 (£)3000 Conclusion, '£200 profit' Organisation and communication Accuracy of writing	M2 A1 B1 OC1 W1 6	Award M1 for sight of ½ × ¾ or ⅜ FT conclusion provided at least M1 awarded
5. 08:55 train from Chester chosen. Attempt to find time difference between 10:35 and 08:55 = 1(hr) 40 (min) or 100(min) (So total time =) 2(hr) 5 (min) or equivalent.	B1 M1 A1 B1 4	May be implied in further work. F.T. for 'their chosen train' (Other trains take 2hr 3m, 1hr 24m, 1hr 59m) F.T. time for 'their train journey' + 25min. *<u>Alternative method</u>* *(Arrives at Holyhead station) 10:35 B1* *F.T. 'their train arrival' + 25min* *(Arrives at ferry) 11:00 B1* *F.T. 'their times'* *Attempt to find time difference between 11:00 and 08:55 M1* *(So total time =) 2(hr) 5 (min) or equivalent. A1*

GCSE Mathematics – Numeracy Unit 1: Intermediate Tier	Mark	Comment
6.(a)(i) 11 (cm) (ii) 6 (cm) (iii) 6cm wide and 6cm length indicated (b) (9 stone 4 pounds =) 9 × 14 + 4 130 (pounds) 15 × 2.2 33 (pounds) Comparison, e.g. 130÷33 or multiples of 33 (33, 66, 99, …) Completes sentence with '4'	B1 B1 B1 M1 A1 M1 A1 B1 B1 9	 OR 130÷2.2 (kg) ≈ 59 (kg) OR 59÷15 or 60÷15 or multiples of 15 (15, 30, 45, …)
7. **52** visited the Millennium Stadium but not Cardiff Castle or Cardiff Bay  	B5 5	B4 for 4 correct entries B3 for 3 correct entries B2 for 2 correct entries B1 for 1 correct entry F.T. from previous entries until second error *Award B3 if an answer of 22 (25 is used instead of 10 giving 3, 29 and an answer of 22).*
8. Perpendicular bisector Stornaway and Ullapool (±2°) Use of correct scale (1cm = 10 miles) Arc from Portree 30 miles shown as approximately 3× distance Muir to Dingwell (i.e. 3cm) Free hand distance 10 miles off shore (i.e. 1cm) Indication of possible sightings Range of bearing ±2°	B1 B1 B1 B1 B1 B2 7	 Award for use of 3cm in arc or 1cm in free hand drawing below FT their Muir to Dingwall distance FT for attempted perpendicular and arc only FT provided at least B2 previously awarded B1 for any 1 bearing within the correct range
9.(a) Area of ends: 10×1 + 10×3 Area of the floor: 20.1×10 Vertical sides with slopes: ½×20×(1+3) × 2 Total surface area of 5 faces: 10×1 + 10×3 + 20.1×10 + 2 ×½×20×(1+3) (10 + 30 + 201 + 80 or 10 + 30 + 201 + 40 + 40=) 321 (m^2) Total cost £ 321 × 20 + 6 × 150 (£)7320 (b) (i) >£140: with pool 120 – 105 (=15) AND without pool 120 – 115 (=5) 10 (hotels) (ii) Interpretation must refer to the greater spread AND greater median of prices in hotels with a pool or equivalent e.g. The prices are generally lower and less varied in hotels without pools.	B1 B1 B1 M1 A2 M1 A1 M1 A1 B3 E1 14	 May be seen with a calculation ×£25 FT their 5 faces provided at least B2 previously awarded. A1 for at least 3 areas accurately evaluated in a sum of areas of 5 sides FT 'their derived 321' Medians and IQRs correct B2 for any 3 of the 4 correct B1 for any 1 or 2 of the 4 correct Depends on previous award of at least B2

	Median (£)	IQR (£)
With pool	108	(130 – 74 =) 56
Without pool	74	(90 – 66 =) 24

GCSE Mathematics – Numeracy Unit 1: Intermediate Tier	Mark	Comment
10. (a) £1 coin (b) 8×10^{-3} (c) 307 (d) 3860 ÷ 200 19.3 (g/cm^3)	B1 B1 B1 M2 A1 6	 M1 for digits 3860 divided by 200 with incorrect place value
11. 4 × ⅓ or equivalent × 2½ or equivalent. = 20/6(hrs) or equivalent OR 200(min) = 3hrs 20 min.	M1 M1 A1 A1 4	 Do not accept 20 ÷ 6. F.T. if at least one M1 and of equivalent difficulty. *If question is misread as 'It took Machine **A** 4 hours .....How long did it take Machine **B**.....?'* *Award SC1 for (4 × 3) / 2½ or 4·8 hours and a further SC1 for 4hrs 48min.*
12(a) ¼ or equivalent (b) TRUE FALSE TRUE TRUE FALSE	B1 B2 3	 B1 for any 4 correct
13.(a)(i) (800 – 300)/ 50 = 10 (ii) Explanation, e.g. 'extra cost per person', '£10 per person', '£100 extra for every 10 people' (iii) Explanation, e.g. 'fixed charge' (b) (£)200	M1 A1 E1 E1 B1 5	Or equivalent Do not accept 'more people the more paid' FT from their gradient if reasonable Accept 'conference cost starts at £300', or 'hire cost' CAO

UNIT 1: NON-CALCULATOR, FOUNDATION TIER
GENERAL INSTRUCTIONS for MARKING GCSE Mathematics - Numeracy

1. The mark scheme should be applied precisely and no departure made from it. Marks should be awarded directly as indicated and no further subdivision made.

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The following may be used in marking schemes or in the marking of scripts to indicate reasons for the marks awarded.
cao = correct answer only
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F.T. = follow through (√ indicates correct working following an error and ✗√ indicates a further error has been made)

Anything given in brackets in the marking scheme is expected but, not required, to gain credit.

3. Premature Approximation
A candidate who approximates prematurely and then proceeds correctly to a final answer loses 1 mark as directed by the Principal Examiner.

4. Misreads
When the data of a question is misread in such a way as not to alter the aim or difficulty of a question, follow through the working and allot marks for the candidates' answers as on the scheme using the new data.
This is only applicable if a wrong value, is used consistently throughout a solution; if the correct value appears anywhere, the solution is not classed as MR (but may, of course, still earn other marks).

5. Marking codes

- 'M' marks are awarded for any correct method applied to appropriate working, even though a numerical error may be involved. Once earned they cannot be lost.
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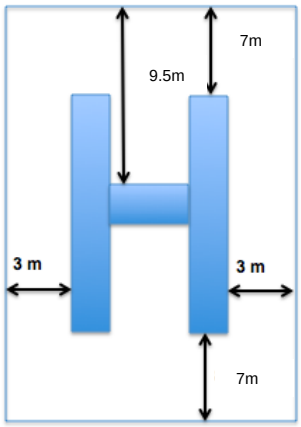
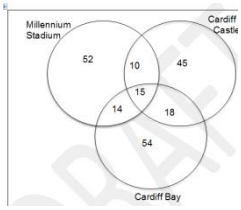
- 'B' marks are independent of method and are usually awarded for an accurate result or statement.
- 'S' marks are awarded for strategy
- 'E' marks are awarded for explanation
- 'U' marks are awarded for units
- 'P' marks are awarded for plotting points
- 'C' marks are awarded for drawing curves

UNIT 1: NON-CALCULATOR, FOUNDATION TIER

GCSE Mathematics – Numeracy Unit 1: Foundation Tier	Mark	Comment
1. (a) 6 (b) Appropriate key For correct pictogram drawn (c) (i) 19 (ii) 16	B1 B1 B3 B1 B1 7	 B2 for 3 or 4 drawn correctly B1 for 2 drawn correctly F.T their key
2. (a) £315 (b) (Salma=) 800 × 2(p) + 500 × 5(p) **OR** (Dafydd 600 × 2(p) + 700 × 5(p) 1600(p) + 2500(p) or (£)16 + (£)25 **OR** 1200(p) + 3500(p) or (£)12 + (£)35 (Salma=) 4100p or £41 (Dafydd=) 4700p or £47 Salma – *Contracts Ceiriog* ***AND*** Dafydd – *Banana Phones*	B1 M1 A1 A1 A1 A1 A1 7	 F.T. provided if at least M1 A1 awarded
3.(a) 230 × 20 or 230 × 10 × 2 or equivalent method based on multiplication (£)4600 (b) Indicates ×2 or double or add total for 20 twice (£)9200 (c)Tables cost (10 × 150 = £) 1500 Budget for chairs 3100 – 10 × 150 Budget for chairs (£) 1600 Attempt to find out how many 49(.50)s or 50s in 1600, e.g. Sight of 1600÷50, 1600/49(.50), 49(.50)+49(.50)+…, two for £100 32 (chairs) Budget left over 1600 – 32 × 49(.50) or 32 × 50(p) or 32 × (£0).5(0) (£)16 Organisation and communication Accuracy of writing	M1 A1 M1 A1 B1 M1 A1 M1 A1 M1 A1 OC1 W1 13	 FT ‘their 4600’ FT ‘their derived 1500’

GCSE Mathematics – Numeracy Unit 1: Foundation Tier	Mark	Comment
4. (a)(i) 60 metres (ii) 10 × 20 200 (m^2) (b)  	B1 M1 A1 B1 B1 B1 B1 7	 Equal values for 'their 3s' and 'their 7s' Both 3s Both 7s 9.5 or FT 'their 7'+ 2.5 evaluated
5. Lines of length 6·5cm AND 5cm. Angle of turn 37° 1090 metres or equivalent	 B1 B1 B2 4	*Allow ± 2mm and ± 2°.* F.T. 'their length from start'× 100. Correct units must be given. B1 for correct length without units. B1 for length only <u>with incorrect units</u> (e.g. 10·9cm or 11cm).
6.(a) (i) 9:00 a.m. (ii) 12:30 p.m. (iii) A (b)(i) States or implies NO with a reason, e.g. 'No, the slope is the same from 8am to 9am' (ii)States or implies NO with a reason, e.g. 'No, the graph shows a further distance away from home between 12 noon and 1 p.m.'	B1 B1 B1 E1 E1 5	
7. (Laura's share=) ½ × ¾ × (£)8000 (£)3000 Conclusion, '£200 profit'	M2 A1 B1 4	Award M1 for sight of ½ × ¾ or ⅜ FT conclusion provided at least M1 awarded
8. 08:55 train from Chester chosen. Attempt to find time difference between 10:35 and 08:55 = 1(hr) 40 (min) or 100(min) (So total time =) 2(hr) 5 (min) or equivalent.	B1 M1 A1 B1 4	May be implied in further work. F.T. for 'their chosen train' (Other trains take 2hr 3m, 1hr 24m, 1hr 59m) F.T. time for 'their train journey' + 25min. *<u>Alternative method</u>* *(Arrives at Holyhead station) 10:35 B1* *F.T. 'their train arrival' + 25min* *(Arrives at ferry) 11:00 B1* *F.T. 'their times'* *Attempt to find time difference between 11:00 and 08:55 M1* *(So total time =) 2(hr) 5 (min) or equivalent. A1*

GCSE Mathematics – Numeracy Unit 1: Foundation Tier	Mark	Comment
9.(a)(i) 11 (cm) (ii) 6 (cm) (iii) 6cm wide and 6cm length indicated (b) (9 stone 4 pounds =) 9 × 14 + 4 130 (pounds) 15 × 2.2 33 (pounds) Comparison, e.g. 130÷33 or multiples of 33 (33, 66, 99, …) Completes sentence with '4'	B1 B1 B1 M1 A1 M1 A1 B1 B1 9	 OR 130÷2.2 (kg) ≈ 59 (kg) OR 59÷15 or 60÷15 or multiples of 15 (15, 30, 45, …)
10. **52** visited the Millennium Stadium but not Cardiff Castle or Cardiff Bay  	B5 5	B4 for 4 correct entries B3 for 3 correct entries B2 for 2 correct entries B1 for 1 correct entry F.T. from previous entries until second error. *Award B4 if an answer of 22 (25 is used instead of 10 giving 3, 29 and an answer of 22).*

UNIT 2: CALCULATOR-ALLOWED, HIGHER TIER
GENERAL INSTRUCTIONS for MARKING GCSE Mathematics - Numeracy

1. The mark scheme should be applied precisely and no departure made from it. Marks should be awarded directly as indicated and no further subdivision made.

2. Marking Abbreviations

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cao = correct answer only
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F.T. = follow through ($\surd$ indicates correct working following an error and $\surd\!\!\!\times$ indicates a further error has been made)

Anything given in brackets in the marking scheme is expected but, not required, to gain credit.

3. Premature Approximation

A candidate who approximates prematurely and then proceeds correctly to a final answer loses 1 mark as directed by the Principal Examiner.

4. Misreads

When the data of a question is misread in such a way as not to alter the aim or difficulty of a question, follow through the working and allot marks for the candidates' answers as on the scheme using the new data.
This is only applicable if a wrong value, is used consistently throughout a solution; if the correct value appears anywhere, the solution is not classed as MR (but may, of course, still earn other marks).

5. Marking codes

- 'M' marks are awarded for any correct method applied to appropriate working, even though a numerical error may be involved. Once earned they cannot be lost.
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- 'B' marks are independent of method and are usually awarded for an accurate result or statement.
- 'S' marks are awarded for strategy
- 'E' marks are awarded for explanation
- 'U' marks are awarded for units
- 'P' marks are awarded for plotting points
- 'C' marks are awarded for drawing curves

UNIT 2: CALCULATOR-ALLOWED, HIGHER TIER

GCSE Mathematics – Numeracy Unit 2: Higher Tier	Mark	Comment
1. 380 × 2.54/100 × or 0.0254× 380 380 × (1+0.0254)^6	B1 M1	May be embedded in further calculation Method of adding on different amounts, 6 year period, following attempts to calculate 2.54% (e.g. 380+9.65(2)=389.65(2) ….)
(£)441.72, (£) 441.71(635…),	A1	Accept (£)441 or (£)442 from appropriate working
Conclusion, e.g. No as less than £460	E1	FT from their compounded amount provided M1
Organisation and communication Accuracy of writing	OC1 W1 6	
2.(a) Mid points 0.5, 1.5, 2.5, 3.5 0.5×12 + 1.5×44 + 2.5×20 + 3.5×4 6 + 66 + 50 + 14 (= 136) ÷ 80 (£)1.7(0)	B1 M1 m1 A1	Accept ±1p FT their mid-points, within & including bounds Their Σfx ÷ 80
(b) 60 × 2.3(0) + 80 × 1.7(0) (=138+136 = 274) ÷ (60 + 80) (£)1.96	M1 m1 A1 7	FT 'their £1.70' or 'their Σfx evaluated' ÷140. FT their 80 provided from attempted sum of the correct numbers An answer of (£)1.95714… is M1, m1, A0
3.(a) Correct multiplier ×0.55×0.8(0) ×0.44 Conclusion, e.g. 'not the same as Jane thinks it is ×0.35', '0.35 ≠ 0.44'	B2 B1 E1	B1 for 0.55 and 0.8(0) or (1–0.45)×(1–0.2) Must show comparative multiplier, i.e. sight of (×)0.35
(b) $T = 0.55(\times)P$ $R = 0.44(\times)P$	B2 B1 7	B1 for $T = P - 0.45(\times)P$ FT their multiplier for (a)

GCSE Mathematics – Numeracy Unit 2: Higher Tier	Mark	Comment
4. Sight of 5 miles ≈ 8 km or 1 litre = 1.75 pints 7 km/l ≈ 7×5/8 miles/l ≈ 7×5/8 ÷ 1.75 (miles/pint) ≈ 7×5/8 ÷ 1.75 × 8 (mpg) 20 (mpg)	B1 M1 M1 M1 A1 5	Or equivalent *Multipliers could appear in any order*
5. 52° or 38°indicated appropriately in the triangle Rig Bay to Jay Cliff = sin52° × 3.2 2.5(216… km) (3.2 + 2.5… =) 5.7 (km)	B1 M2 A1 B1 5	 Sin52° = RtoJ/3.2 FT 'their RtoJ' provided M1 awarded
6. Correct substitution into formula. Using 16553(p) U = 16553/1·05 - 90 × 31·48 or equivalent 11·546 (Units used =) 1120	M1 m1 m1 A1 4	Do not penalise using (£)165.53 at this stage. The two 'm' marks may be awarded in either order. C.A.O. Accept answers of 1120 ± 1
7.(a) (i) $7.2^2 - 3.4^2 = h^2$ or other correct initial use of Pythagoras' Theorem $h^2 = 40.28$ or (h =) √40.28 (h =) 6.3(46… cm) Volume = ½ × 3.4 × 6.3(46..) × 18.4 198.52(32…) 197(.064) or 197.1 (200 - 198.52(32..cm^3) = 1.48 =) 1.5 (cm^3) (ii) Explanation, states or implies e.g. 'too tight', 'could be different shape' (b) 3.35, 3.45, 2.55, 2.65, 6.75, 6.85 Greatest 3.45×2.65×6.85 (=62.626125cm^3) AND Least 3.35×2.55×6.75 (=57.661875cm^3) Difference/Least (×100) (4.96425/57.661875) 8.6(%)	 M1 A1 A1 M1 A1 B1 E1 B2 M1 m1 A1 12	 Accept $7.2^2 - 3.4^2$, or $7.2^2 = 3.4^2 + \ldots^2$ FT 'their derived 6.3(46…) Accept answers from premature approximation CAO Sight of all 6 greatest and least values B1 for any 3 of the 6 Accept 9(%) from correct working
8(a) Correct or reasonable estimates for the population densities, identifying Singapore as greatest and Wales as the least. 7540.78 ÷ 144.790713… 52(.0805…. times) (b) Wales and Tonga (c) False True False False False	B2 M1 A1 B1 B2 7	Singapore and Wales may not be identified explicitly but implied in later working. B1 at least 3 reasonable estimates for the population densities B1 for 4 correct

Country	Population density
Wales	144.790713…
Singapore	7540.78..
Bermuda	1212.018…
India	378.55..
Belgium	366.706…
Tonga	144.819..

GCSE Mathematics – Numeracy Unit 2: Higher Tier	Mark	Comment
9(a) Diagonal^2 = 8^2 + 8^2 Diagonal = 11.3(13..cm) Height = tan32° × ½ Diagonal Height 3.5(347.. cm) (b) Volume pyramid = ⅓ × (8 × 8) × 3.5(347…) 75.4(09…cm^3) (c) Hemisphere: 75.4(09…cm^3) = ½× π×r^3×4/3 $r^3 = \frac{3 \times 75.4(09\ldots) \times 2}{4 \times \pi}$ Radius hemisphere 3.3(0….cm)	M1 A1 M2 A1 M1 A1 M1 m1 A1 10	 FT their derived diagonal M1 for tan32° = height/ ½ Diagonal FT their derived height FT their derived volume of pyramid or total volume Isolating r^3 or r *Allow SC1 if worked with volume of sphere equated to derived cap volume with r evaluated accurately*
10.(a) **D:** Giving each pupil a raffle ticket and then randomly drawing raffle tickets for selection (b) $\frac{23456}{23456 + 43244 + 83124 + 11782 + 63789}$ $\frac{23456}{225395}$ × 250 26 (people)	B1 M1 m1 A1 4	 Intention to find Central Party share of the votes OR sight of 0.104066(194) × 250 Must be given as a whole number

GCSE Mathematics – Numeracy Unit 2: Higher Tier	Mark	Comment
11.		*Allow equivalent working (e.g. working in weeks, months or annually)* *Allow reasonable approximation at each stage* *Penalise once only for use of 48 weeks (12 × 4 weeks)*
NATIONAL INSURANCE		
[Weekly gross salary (£)47840 ÷ 52 =] (£)920	B1	
0.12 × [(£)805 – (£)153]+0.02 × [(£)920 – (£)805]	M2	M1 for one FT 'their (£)920'
(£)80.54	A2	A1 for (£)78.24 or (£)2.30 FT 'their (£)78.24' + 'their (£)2.30' (may be seen in later workings)
TAX		
(0.2 × 21865=)(£)4373	B1	
0.4 × (47840 – 31865)	M1	Accept 0.4 × (47840 – 31866)
(£)6390.(00)	A1	Accept (£)6389.6(0)
((£)4373 + (£)6390.(00)=)£10763	B1	Accept ((£)4373 + (£)6389.6(0)=) £10762.6(0) FT 'their (£)4373' + 'their(£)6389.6(0)' Award B1 for sight of (£)206.98 or (£)206.97 (may be seen in later workings)
PENSION		
[(£)920 × 0·085=] OR [(£)47840 × 0·085 ÷ 52]	M1	FT 'their (£)920'
(£)78.2(0)	A1	
TOTAL (Weekly)		
920 – [(£)80.54 + (£)206.98 +(£)78.2(0)]	M1	Accept 920 – [(£)80.54 + (£)206.97 +(£)78.2(0)] FT all their values for 'weekly gross salary', 'tax', 'NI' and 'pension'
=(£)554.28	A1	Accept (£)554.29
	13	

UNIT 2: CALCULATOR-ALLOWED, INTERMEDIATE TIER
GENERAL INSTRUCTIONS for MARKING GCSE Mathematics - Numeracy

1. The mark scheme should be applied precisely and no departure made from it. Marks should be awarded directly as indicated and no further subdivision made.

2. Marking Abbreviations

The following may be used in marking schemes or in the marking of scripts to indicate reasons for the marks awarded.

cao = correct answer only
MR = misread
PA = premature approximation
bod = benefit of doubt
oe = or equivalent
si = seen or implied
ISW = ignore subsequent working

F.T. = follow through ($\surd$ indicates correct working following an error and $\surd\!\!\!\times$ indicates a further error has been made)

Anything given in brackets in the marking scheme is expected but, not required, to gain credit.

3. Premature Approximation

A candidate who approximates prematurely and then proceeds correctly to a final answer loses 1 mark as directed by the Principal Examiner.

4. Misreads

When the data of a question is misread in such a way as not to alter the aim or difficulty of a question, follow through the working and allot marks for the candidates' answers as on the scheme using the new data.
This is only applicable if a wrong value, is used consistently throughout a solution; if the correct value appears anywhere, the solution is not classed as MR (but may, of course, still earn other marks).

5. Marking codes

- 'M' marks are awarded for any correct method applied to appropriate working, even though a numerical error may be involved. Once earned they cannot be lost.
- 'm' marks are dependant method marks. They are only given if the relevant previous 'M' mark has been earned.
- 'A' marks are given for a numerically correct stage, for a correct result or for an answer lying within a specified range. They are only given if the relevant M/m mark has been earned either explicitly or by inference from the correct answer.
- 'B' marks are independent of method and are usually awarded for an accurate result or statement.
- 'S' marks are awarded for strategy
- 'E' marks are awarded for explanation
- 'U' marks are awarded for units
- 'P' marks are awarded for plotting points
- 'C' marks are awarded for drawing curves

UNIT 2: CALCULATOR-ALLOWED, INTERMEDIATE TIER

GCSE Mathematics – Numeracy Unit 2: Intermediate Tier	Mark	Comment
1. (a)(i) £3.60 (ii) £3.51 (b) ⅗ × 1.8(0) or 1.8(0) - ⅖ × 1.8(0) or equivalent (£)1.08 (c) (0.4 × 3.4(0) =) (£)1.36 (cost of grapes) (0.5 kg peaches is 3.46 – 1.36 =) (£)2.1(0) 1kg of peaches (£)4.2(0)	B1 B1 M1 A1 B1 B1 B1 7	 FT 'their derived cost of grapes', not £3.40 FT provided previous B mark awarded
2. FALSE FALSE FALSE TRUE FALSE	B2 2	B1 for any 4 correct
3. (Package) B (Package) G	B2 B2 4	*May be given in any order.* (Both of these fail on one of the preferred conditions). B1 for A or H chosen. (Fails on two conditions). B0 for C or F chosen. (All fail on three of the conditions) B0 for D and E. (Both fail on a definite requirement).
4. C B A D	B3 3	B3 for all 4 correct B2 for 2 or 3 correct B1 for 1 correct
5. (a) Old tablet: (Loss) 0.35 × 240 (Selling price=) 240 − 0.35 × 240 (£)156 (New tablet costs=) 365 – 0.2 × 365 or 0.8 × 365 (£)292 (Extra money needed)(=292 – 156) (£)136 Organisation and communication Accuracy of writing (b) C	 M1 m1 A1 M1 A1 B1 OC1 W1 B1 9	 OR M2 for 0.65 × 240 FT 'their 156' provided M1 awarded for loss, and 'their 292' provided M1 awarded for new tablet cost *SC1 for (£)209 (discount for special offer not considered)*

GCSE Mathematics – Numeracy Unit 2: Intermediate Tier	Mark	Comment
6. Sight of $\frac{(100 + 40)}{2} \times BC$ or equivalent	B1	For a correct expression for the total area of *ABCD* in terms of *BC*. F.T. their area only if in terms of *BC* and is dimensionally correct.
$\frac{(100 + 40)}{2} \times BC = 3500$	M1	For equating their expression for area, in terms of *BC*, with 3500.
$BC = 2 \times 3500 / 140$	A1	Further F.T. only if of equivalent difficulty
$= 50$(m)	A1 4	
7. (a) Uniform scale on vertical axis.	B1	*P0,L0 if no attempt at uniform scaling.*
Plotting at least two correct points.	P1	± '½ a small square'. The origin may be one of the points.
Correct line drawn.	L1	Correct line implies P1L1.
(b)(10 stone =) 140 (lbs)	B1	For sight of 140. It may be implied in further work.
Any correct strategy, e.g. 14 times their value at 10 lbs.	M1	Accept 10 times their value at 14lbs, if line drawn extends that far.
A correct answer for their line.	A1 6	F.T. their line, OR B1, M1, A1 for answers between 63(kg) and 64(kg) inclusive.
8. (a) Considering multiples of 18 and 24, e.g. sight of 18, 36, 54, .. AND 24, 48, 72, .., OR Looking at factor of 18 and 24, e.g. sight of 2×9 AND 2×12 or 2×3×3 AND 2×2×2×3 or other partial factorising	S1	At least 3 correct multiples for both
Correct list of multiples of 18 to at least 72, or multiple 72 AND Correct list of multiples of 24 to at least 72, or multiple 72 , OR Sight of 2×3×3×4	M1	18, 36, 54, 72 24, 48, 72
Sight of 72 (as common multiple or number of minutes)	A1	OR 1 hour 12 minutes FT time from 06:00 for their number of minutes provided S1 and M1 awarded
Consideration of 16½ hours compared to 72 minutes, e.g. 990/72	M1	
Final time 06:00 add13×72 minutes (or 936 mins = 15.6 hr=15 hrs 36 mins) 21:36	m1 A1 6	
9. $380 \times 2.54/100 \times$ or 0.0254×380 $380 \times (1+0.0254)^6$	B1 M1	May be embedded in further calculation Method of adding on different amounts, 6 year period, following attempts to calculate 2.54% (e.g. 380+9.65(2)=389.65(2) ….)
(£)441.72, (£) 441.71(635…),	A1	Accept (£)441 or (£)442 from appropriate working
Conclusion, e.g. No as less than £460	E1 4	FT from their compounded amount provided M1

GCSE Mathematics – Numeracy Unit 2: Intermediate Tier	Mark	Comment
10(a) $7.2^2 - 3.4^2 = h^2$ or other correct initial use of Pythagoras' Theorem $h^2 = 40.28$ or (h =) $\sqrt{40.28}$ (h =) 6.3(46… cm) Volume = ½ × 3.4 × 6.3(46..) × 18.4 198.52(32…) or 197(.064) or 197.1 (200 - 198.52(32..cm^3) = 1.48 =) 1.5 (cm^3) (b) Explanation, states or implies e.g. 'too tight', 'could be different shape'	M1 A1 A1 M1 A1 B1 E1 7	Accept $7.2^2 - 3.4^2$, or $7.2^2 = 3.4^2 + \ldots^2$ FT 'their derived 6.3(46…) Accept answers from premature approximation CAO
11.(a)Mid points 0.5, 1.5, 2.5, 3.5 0.5×12 + 1.5×44 + 2.5×20 + 3.5×4 6 + 66 + 50 + 14 (= 136) ÷ 80 (£)1.7(0) (b) 60 × 2.3(0) + 80 × 1.7(0) (=138+136 = 274) ÷ (60 + 80) (£)1.96	B1 M1 m1 A1 M1 m1 A1 7	Accept ±1p FT their mid-points, within & including bounds Their Σfx ÷ 80 FT 'their £1.70' or 'their Σfx evaluated' ÷140. FT their 80 provided from attempted sum of the correct numbers An answer of (£)1.95714… is M1, m1, A0
12.(a)Correct multiplier ×0.55×0.8(0) ×0.44 Conclusion, e.g. 'not the same as Jane thinks it is ×0.35', '0.35 ≠ 0.44' (b) $T = 0.55(\times)P$ $R = 0.44(\times)P$	B2 B1 E1 B2 B1 7	B1 for 0.55 and 0.8(0) or (1–0.45)×(1–0.2) Must show comparative multiplier, i.e. sight of (×)0.35 B1 for $T = P - 0.45(\times)P$ FT their multiplier for (a)(i)
13. Sight of 5 miles ≈ 8 km or 1 litre = 1.75 pints 7 km/l ≈ 7×5/8 miles/l ≈ 7×5/8 ÷ 1.75 (miles/pint) ≈ 7×5/8 ÷ 1.75 × 8 (mpg) 20 (mpg)	B1 M1 M1 M1 A1 5	Or equivalent *Multipliers could appear in any order*
14.52° or 38°indicated appropriately in the triangle Rig Bay to Jay Cliff = sin52° × 3.2 2.5(216… km) (3.2 + 2.5… =) 5.7 (km)	B1 M2 A1 B1 5	 Sin52° = RtoJ/3.2 FT 'their RtoJ' provided M1 awarded
15. Correct substitution into formula. Using 16553(p) U = $\frac{16553/1{\cdot}05 - 90 \times 31{\cdot}48}{11{\cdot}546}$ or equivalent (Units used =) 1120	M1 m1 m1 A1 4	Do not penalise using (£)165.53 at this stage. The two 'm' marks may be awarded in either order. C.A.O. Accept answers of 1120 ± 1

UNIT 2: CALCULATOR-ALLOWED, FOUNDATION TIER
GENERAL INSTRUCTIONS for MARKING GCSE Mathematics - Numeracy

1. The mark scheme should be applied precisely and no departure made from it. Marks should be awarded directly as indicated and no further subdivision made.

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cao = correct answer only
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bod = benefit of doubt
oe = or equivalent
si = seen or implied
ISW = ignore subsequent working

F.T. = follow through (√ indicates correct working following an error and ✗√ indicates a further error has been made)

Anything given in brackets in the marking scheme is expected but, not required, to gain credit.

3. Premature Approximation

A candidate who approximates prematurely and then proceeds correctly to a final answer loses 1 mark as directed by the Principal Examiner.

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When the data of a question is misread in such a way as not to alter the aim or difficulty of a question, follow through the working and allot marks for the candidates' answers as on the scheme using the new data.
This is only applicable if a wrong value, is used consistently throughout a solution; if the correct value appears anywhere, the solution is not classed as MR (but may, of course, still earn other marks).

5. Marking codes

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- 'm' marks are dependant method marks. They are only given if the relevant previous 'M' mark has been earned.
- 'A' marks are given for a numerically correct stage, for a correct result or for an answer lying within a specified range. They are only given if the relevant M/m mark has been earned either explicitly or by inference from the correct answer.
- 'B' marks are independent of method and are usually awarded for an accurate result or statement.
- 'S' marks are awarded for strategy
- 'E' marks are awarded for explanation
- 'U' marks are awarded for units
- 'P' marks are awarded for plotting points
- 'C' marks are awarded for drawing curves

UNIT 2: CALCULATOR-ALLOWED, FOUNDATION TIER

GCSE Mathematics – Numeracy Unit 2:Foundation Tier	Mark	Comment
1. (a) **Item** / **Cost** Pair of gloves (£22.49) 3 water bottles (£) 18.36 Pair of shoes (£) 79.95 2 pairs of shorts (£) 81(.00) Total (£)201.8(0)	B4	B1 for each correct answer F.T. if no more than one error
(b) (£)201.8(0) $\frac{5}{100}$ × (£)201.8(0) or equivalent	M2	F.T. 'their total from (a)' M1 for sight of $\frac{5}{100}$ × (£)201.8(0) or equivalent or (£)10.09
(£)191.71	A1 7	Accept rounded or truncated answers to 2dp from F.T . F.T. 'their 201.8(0)' – 'their 10.09' provided of equivalent difficulty
2. Arrow drawn or indicated to 530 (grams)	B3 3	Accept indication between 520 and 540 exclusive Award B2 for sight of 350 + 180 (=530) OR correct evaluation indicated on diagram of 350 + 'their 180' Award B1 for sight of 180 OR for 350 + 'their 180' e.g. 350 + 190 (=540) or 350 + 140 (=490)
3.(a) Apples **15**(kg) Total to females **28**(kg) Females **4**(kg) more grapes than males	B1 B1 B1	
(b)(i) Explanation, e.g. 'she only looked at the highest bar for the males'	E1	
(ii) Grapes 20(kg), bananas 18(kg), (apples 15kg) Most popular stated as grapes	M1 A1 6	Totals for grapes and bananas correct
4. (a) **Subject** / **Result as a percentage** Mathematics 74% Welsh 70(%) Science 75(%) English 67(%)	B3	Award B1 for each correct answer
(b) Science	B1 4	FT their completed table of percentages in (a)
5(a) 1200 (metres) 900 (metres) 1.5 (furlongs)	B1 B1 B1	
(b) Explanation with calculations given	E1	
2000 (metres)	B1 5	

GCSE Mathematics – Numeracy Unit 2:Foundation Tier	Mark	Comment
6. (Perimeter=) 12 + 9 + 12 + 9 = 42 (m) (Number of panels =42 ÷ 3 =) 14 (Cost =) 14 × (£)21.98 =(£)307.72 Organisation and communication Accuracy of writing	M1 A1 B1 M1 A1 OC1 W1 7	F.T. their perimeter F.T. their number of panels *Alternative method: dividing by 3 to get no.of panels on 1 side B1* 4 + 3 + 4 + 3 *M1* *(Number of panels =)14 A1* *Cost 14× (£)21.98 M1* (£)307.72 *A1* *Award SC3 for unsupported answer of (£)153.86*
7. (a)(i) £3.60 (ii) £3.51 (b) ⅗ × 1.8(0) or 1.8(0) - ⅖ × 1.8(0) or equivalent (£)1.08 (c) (0.4 × 3.4(0) =) (£)1.36 (cost of grapes) (0.5 kg peaches is 3.46 – 1.36 =) (£)2.1(0) 1kg of peaches (£)4.2(0)	B1 B1 M1 A1 B1 B1 B1 7	 FT 'their derived cost of grapes', not £3.40 FT provided previous B mark awarded
8. FALSE FALSE FALSE TRUE FALSE	B2 2	B1 for any 4 correct
9. (Package) B (Package) G	B2 B2 4	*May be given in any order.* (Both of these fail on one of the preferred conditions). B1 for A or H chosen. (Fails on two conditions). B0 for C or F chosen. (All fail on three of the conditions) B0 for D and E. (Both fail on a definite requirement).
10. C B A D	B3 3	B3 for all 4 correct B2 for 2 or 3 correct B1 for 1 correct

GCSE Mathematics – Numeracy Unit 2:Foundation Tier	Mark	Comment
11. (a) Old tablet: (Loss) 0.35 × 240 (Selling price=) 240 − 0.35 × 240 (£)156 (New tablet costs=) 365 – 0.2 × 365 or 0.8 × 365 (£)292 (Extra money needed)(=292 – 156) (£)136 (b) C	 M1 m1 A1 M1 A1 B1 B1 7	 OR M2 for 0.65 × 240 FT 'their 156' provided M1 awarded for loss, and 'their 292' provided M1 awarded for new tablet cost *SC1 for (£)209 (discount for special offer not considered)*
12. Sight of $\frac{(100 + 40)}{2} \times BC$ or equivalent $\frac{(100 + 40)}{2} \times BC = 3500$ $BC = 2 \times 3500 / 140$ = 50(m)	B1 M1 A1 A1 4	For a correct expression for the total area of *ABCD* in terms of *BC*. F.T. their area only if in terms of *BC* and is dimensionally correct. For equating their expression for area, in terms of *BC*, with 3500. Further F.T. only if of equivalent difficulty
13. (a) Considering multiples of 18 and 24, e.g. sight of 18, 36, 54, .. AND 24, 48, 72, .., OR Looking at factor of 18 and 24, e.g. sight of 2×9 AND 2×12 or 2×3×3 AND 2×2×2×3 or other partial factorising Correct list of multiples of 18 to at least 72, or multiple 72 AND Correct list of multiples of 24 to at least 72, or multiple 72 , OR Sight of 2×3×3×4 Sight of 72 (as common multiple or number of minutes) Consideration of 16½ hours compared to 72 minutes, e.g. 990/72 Final time 06:00 add13×72 minutes (or 936 mins = 15.6 hr=15 hrs 36 mins) 21:36	S1 M1 A1 M1 m1 A1 6	At least 3 correct multiples for both 18, 36, 54, 72 24, 48, 72 OR 1 hour 12 minutes FT time from 06:00 for their number of minutes provided S1 and M1 awarded

ASSESSMENT GRIDS

GCSE Mathematics - Numeracy

Unit 1: Higher Tier

Qu.	Topic	Max mark	Assessment Objectives AO1	AO2	AO3	Common (Interm)	OCW
1	Whale loci	7		7		7 (Q8)	
2	Hotel: area and cumulative frequency	14		10	4	14 (Q9)	
3	Standard form, division, gold bar density	6	6			6 (Q10)	
4	Circuit board machines	4		4		4 (Q11)	
5	Boxplots	3	1		2	3 (Q12)	
6	Hotel: interpreting straight lines	5	2	1	2	5 (Q13)	
7	Similar shapes	9	2	7			*
8	Velocity of car	7	4	3			
9	Mobile phone data histogram	8		4	4		
10	mp3 player	4		4			
11	Road building costs	13	4		9		
	Totals	**80**	**19**	**40**	**21**	**39**	

GCSE Mathematics - Numeracy

Unit 1: Intermediate Tier

Qu.	Topic	Max mark	Assessment Objectives AO1	AO2	AO3	Common (Found)	Common (Higher)	OCW
1	Martina walks scale drawing	4		4		4 (Q5)		
2	Robbie school day travel graph	5	3		2	5 (Q6)		
3	Car valet: June costs	8	4	4				
4	Car valet: profit and loss	6			6	4 (Q7)		*
5	Ferry problem	4		4		4 (Q8)		
6	Aquarium visit: Scatter diagram kg stones lbs	9	3	6		9 (Q9)		
7	Cardiff: Venn diagram	5			5	5 (Q10)		
8	Whale loci	7		7			7 (Q1)	
9	Hotel: area and cumulative frequency	14		10	4		14 (Q2)	
10	Standard form, division, gold bar density	6	6				6 (Q3)	
11	Circuit board machines	4		4			4 (Q4)	
12	Boxplots	3	1		2		3 (Q5)	
13	Hotel: interpreting straight lines	5	2	1	2		5 (Q6)	
	Totals	**80**	**19**	**40**	**21**	**31**	**39**	

GCSE Mathematics - Numeracy

Unit 1: Foundation Tier

Qu.	Topic	Max mark	Assessment Objectives AO1	AO2	AO3	Common (Interm)	OCW
1	Medals: pictogram	7	3	4			
2	Mobile phones deals	7	1	6			
3	Hotel: beds, tables and chairs	13		9	4		*
4	Hotel: area, missing lengths	7	3		4		
5	Martina walks scale drawing	4		4		4 (Q1)	
6	Robbie school day travel graph	5	3		2	5 (Q2)	
7	Car valet: profit and loss	4			4	4 (Q4)	
8	Ferry problem	4		4		4 (Q5)	
9	Aquarium visit: Scatter diagram kg stones lbs	9	3	6		9 (Q6)	
10	Cardiff: Venn diagram	5			5	5 (Q7)	
	Totals	**65**	**13**	**33**	**19**	**31**	

GCSE Mathematics - Numeracy

Unit 2: Higher Tier

			Assessment Objectives				
Qu.	**Topic**	**Max mark**	**AO1**	**AO2**	**AO3**	**Common (Interm)**	**OCW**
1	AER saving to buy scooter	6		6		4 (Q9)	*
2	Price of a bottle of water	7	4	3		7 (Q11)	
3	Sandwich discount multiplier equation	7		3	4	7 (Q12)	
4	Fuel consumption	5		5		5 (Q13)	
5	Right-angled triangle bearings	5		5		5 (Q14)	
6	Formula substitution	4	4			4 (Q15)	
7	Triangular prism box bounds/cuboid	12		5	7	7 (Q10)	
8	Population density	7	5		2		
9	Volume: Fence caps	10	2	3	5		
10	Sampling and *VotePredict*	4	1	3			
11	Imran's salary	13		13			
	Totals	**80**	**16**	**46**	**18**	**39**	

GCSE Mathematics - Numeracy

Unit 2: Intermediate Tier

Qu.	Topic	Max mark	Assessment Objectives			Common (Found)	Common (Higher)	OCW
			AO1	AO2	AO3			
1	Fruit prices	7	4	3		7 (Q7)		
2	Rugby: interpreting the mean	2			2	2 (Q8)		
3	Holiday dates	4			4	4 (Q9)		
4	Interpreting graphs	3		3		3 (Q10)		
5	Upgrading tablet + interpreting pie chart	9		9		7 (Q11)		*
6	Area Trapezium	4		4		4 (Q12)		
7	Conversion graph	6		6				
8	Buses leaving at same time	6			6	6 (Q13)		
9	AER saving to buy scooter	4		4			4 (Q1)	
10	Triangular prism box bounds	7			7		7 (Q7a)	
11	Price of a bottle of water	7	4	3			7 (Q2)	
12	Sandwich discount multiplier equation	7		3	4		7 (Q3)	
13	Fuel consumption	5		5			5 (Q4)	
14	Right-angled triangle bearings	5		5			5 (Q5)	
15	Formula substitution	4	4				4 (Q6)	
	Totals	**80**	**12**	**45**	**23**	**33**	**39**	

GCSE Mathematics - Numeracy

Unit 2: Foundation Tier

			Assessment Objectives				
Qu.	**Topic**	**Max mark**	**AO1**	**AO2**	**AO3**	**Common (Interm)**	**OCW**
1	Charity bike ride	7	4	3			
2	Rhys sandwich	3		3			
3	Fruit shop bar charts	6		3	3		
4	Jac's test results	4	4				
5	Conversion furlongs metres	5	3		2		
6	Vegetable patch	7		7			*
7	Fruit prices	7	4	3		7 (Q1)	
8	Rugby: interpreting the mean	2			2	2 (Q2)	
9	Holiday dates	4			4	4 (Q3)	
10	Interpreting graphs	3		3		3 (Q4)	
11	Upgrading tablet + interpreting pie chart	7		7		7 (Q5)	
12	Area Trapezium	4		4		4 (Q6)	
13	Buses leaving at same time	6			6	6 (Q8)	
	Totals	**65**	**15**	**33**	**17**	**33**	