Surname StemUp Model Solution	Centre Number	Candidate Number
Other Names		0

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GCSE

3310U10-1

S18-3310U10-1

MATHEMATICS – NUMERACY
UNIT 1: NON-CALCULATOR
FOUNDATION TIER

TUESDAY, 8 MAY 2018 – MORNING

1 hour 30 minutes

ADDITIONAL MATERIALS

The use of a calculator is not permitted in this examination.

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

INSTRUCTIONS TO CANDIDATES

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

You may use a pencil for graphs and diagrams only.

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

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

If you run out of space, use the continuation page at the back of the booklet. Question numbers must be given for the work written on the continuation page.

Take π as 3·14.

INFORMATION FOR CANDIDATES

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

Unless stated, diagrams are not drawn to scale.

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

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

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

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

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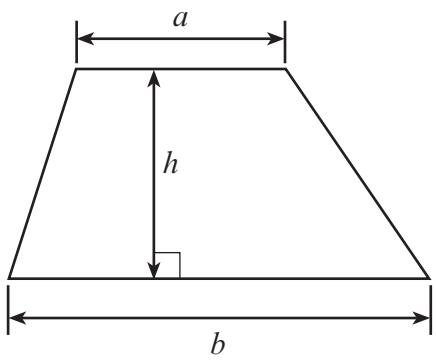
Formula List - Foundation Tier

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



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1. The following information was taken from the internet in 2017.

Highest temperatures recorded in the UK:

United Kingdom			
England	38·5°C (101·3°F)	Faversham, Kent	10 August 2003
Northern Ireland	30·8°C (87·4°F)	Knockarevan, County Fermanagh Belfast, County Antrim	30 June 1976 12 July 1983
Scotland	32·9°C (91·2°F)	Greycrook, Scottish Borders	9 August 2003
Wales	35·2°C (95·4°F)	Hawarden Bridge, Flintshire	2 August 1990

Lowest temperatures recorded in the UK:

United Kingdom			
England	–26·1°C (–15·0°F)	Newport, Shropshire	10 January 1982
Northern Ireland	–18·7°C (–1·7°F)	Castlederg, County Tyrone	24 December 2010
Scotland	–27·2°C (–17·0°F)	Braemar, Aberdeenshire Altnaharra, Sutherland	11 February 1895 and 10 January 1982 30 December 1995
Wales	–23·3°C (–9·9°F)	Rhayader, Powys	21 January 1940

Use the information above to answer the following questions.

(a) What was the lowest temperature recorded in the UK in °C? [1]

Lowest temperature: ....–27.2.... °C

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(b) Using the values in the table, what is an approximate value for 40°C in °F? Circle your answer. [1]

80°F 95°F 100°F 105°F 120°F

35.2°C ≈ 95.4°F, so 40°C is a bit more than 95.4°F ≈ 105°F

(c) Calculate the difference between the highest and lowest temperatures recorded in Wales in °C. [2]

Highest in Wales = 35.2°C, lowest in Wales = −23.3°C

Difference = 35.2 − (−23.3)

= 35.2 + 23.3

Difference = 58.5°C

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2. Jane carried out a survey.
She asked 40 people to choose their favourite TV channel.
Their answers are shown below.

BBC1	S4C	ITV 1	BBC1	Channel 5
ITV 1	BBC2	Channel 5	ITV 1	BBC1
Channel 5	BBC1	Channel 5	ITV 1	S4C
S4C	ITV 1	BBC2	BBC1	Channel 5
BBC2	BBC2	ITV 1	ITV 1	BBC1
BBC2	ITV 1	S4C	BBC1	ITV 1
BBC1	S4C	ITV 1	ITV 1	BBC1
ITV 1	Channel 5	BBC1	S4C	Channel 5

(a) Draw a **vertical line diagram** to display Jane's data.
Use the square grid on the opposite page. [4]

BBC1 = 10, BBC2 = 5, ITV 1 = 12, S4C = 6, Channel 5 = 7

Total = 10 + 5 + 12 + 6 + 7 = 40 ✓

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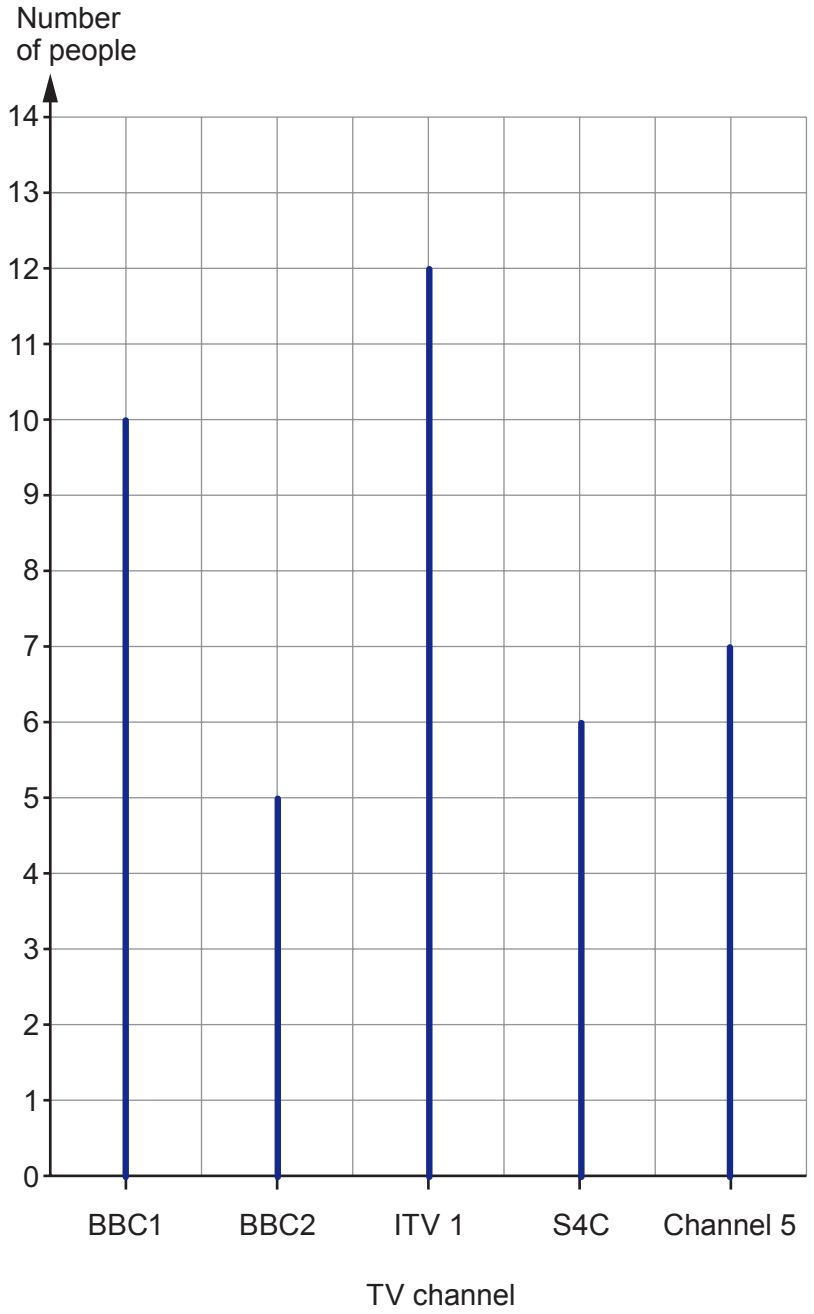

(b) How can you check that you have included all of Jane's data? [1]

Add up all the frequencies: 10 + 5 + 12 + 6 + 7 = 40,

which is the total number of people Jane asked.

(c) What is the modal TV channel? [1]

ITV 1

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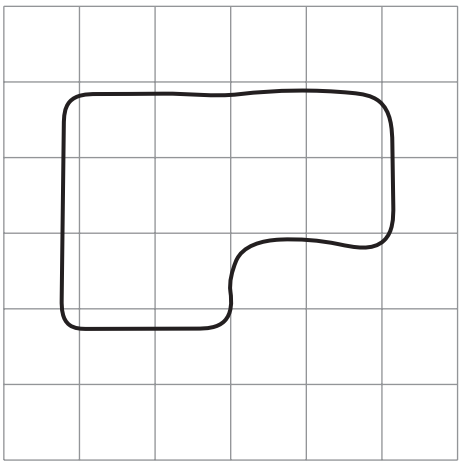
3. *In this question, you will be assessed on the quality of your organisation, communication and accuracy in writing.*

Mr Jones wants to build a new house.
He has found two suitable plots of land which cost the same amount.
Each plot of land has space for his house and a large garden.
The plan for each plot of land is shown below.

Plot A Scale: 1 square = 100 m^2



Plot B

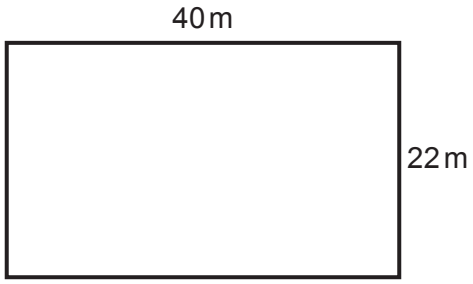


Diagram not drawn to scale

By considering the area of each plot, decide which plot of land Mr Jones should buy.
You must show all your working.

Give a reason for your answer. [6 + 2 OCW]

Plot A: counting the whole squares and part squares inside the shape gives about 11 squares.

Area of Plot A ≈ 11 × 100 = 1100 m^2

Plot B is a rectangle, so area = length × width

Area of Plot B = 40 × 22 = 40 × 20 + 40 × 2 = 800 + 80 = 880 m^2

Comparing: 1100 m^2 is more than 880 m^2 (about 220 m^2 more).

Conclusion: the plots cost the same, so Mr Jones should buy Plot A because it has the bigger area, giving more space for his house and garden.

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4. A lighting company sells sets of lights in different sizes.
Some of the sets are shown below.

Set 1 3 light bulbs	
Set 2 5 light bulbs	
Set 3 7 light bulbs	

The pattern can be continued to make larger sets of lights.

(a) How many light bulbs are needed to make **Set 5**?
Circle your answer. [1]

9 10 11 12 13

3, 5, 7, 9, 11 (add 2 bulbs each time)

(b) Which **set** has 27 light bulbs? [2]

3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27

or $(27 - 1) \div 2 = 26 \div 2 = 13$

Set 13

(c) A customer thinks that to find the number of bulbs that are in a set, you multiply the set number by 3.
Is the customer correct?

Yes ☐ No ☑

Give a reason for your answer. [1]

No, because you add 2 bulbs each time, not 3.

For example Set 2 has 5 bulbs, but $2 \times 3 = 6$.

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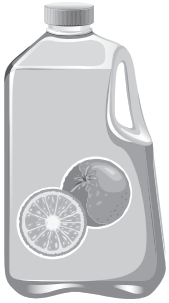
5. *(a)* *Cornell's* supermarket sells 1-litre cartons of orange juice at £1.80.

Cornell's supermarket has an offer of 'buy 2 get 1 free'.

Larkman's supermarket sells 2-litre bottles of orange juice at £2.20.



Janice needs to buy 6 litres of orange juice.

How much money would Janice save by buying the orange juice at *Larkman's* supermarket? [4]

Cornell's: buy 2 get 1 free, so for 3 litres you pay for 2 cartons

6 litres = 2 lots of 3 litres, so Janice pays for 4 cartons

Cost at Cornell's = 4 × £1.80 = £7.20

Larkman's: 6 litres = 6 ÷ 2 = 3 bottles

Cost at Larkman's = 3 × £2.20 = £6.60

Saving = £7.20 − £6.60 = £0.60

Janice would save 60p by buying at Larkman's.

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(b) The diagram shows a sketch of the top part of a 1-litre carton.
There is a circular hole cut out for the plastic lid.

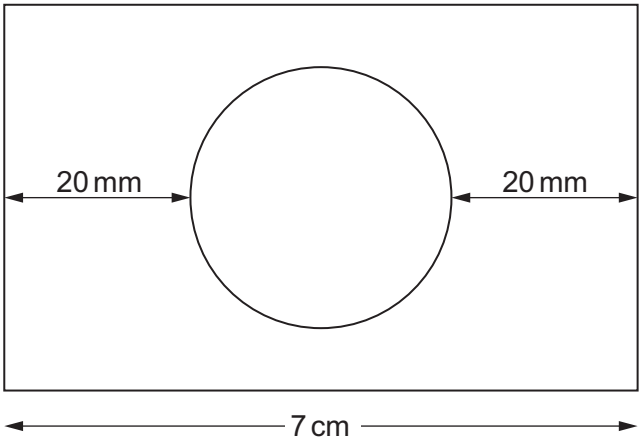

Diagram not drawn to scale

What is the radius of the circular hole?
Give your answer in **mm**. [3]

7 cm = 70 mm

Diameter of hole = 70 − (20 + 20) = 70 − 40 = 30 mm

Radius = 30 ÷ 2 = 15 mm

Radius of the hole = 15 mm

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6. Suzanna and her 2 friends are studying at Aberystwyth University.
They rent a 3-bedroom house together.

The 3 friends share the cost of the rent equally between them.

In April, the rent was £720 per month.
In October, the rent is to be increased by 15%.

How much rent will Suzanna pay in October? [4]

10% of £720 = £72, 5% of £720 = £36

15% of £720 = £72 + £36 = £108

Rent in October = £720 + £108 = £828 per month

Suzanna pays £828 ÷ 3 = £276

Suzanna will pay £276 in October.

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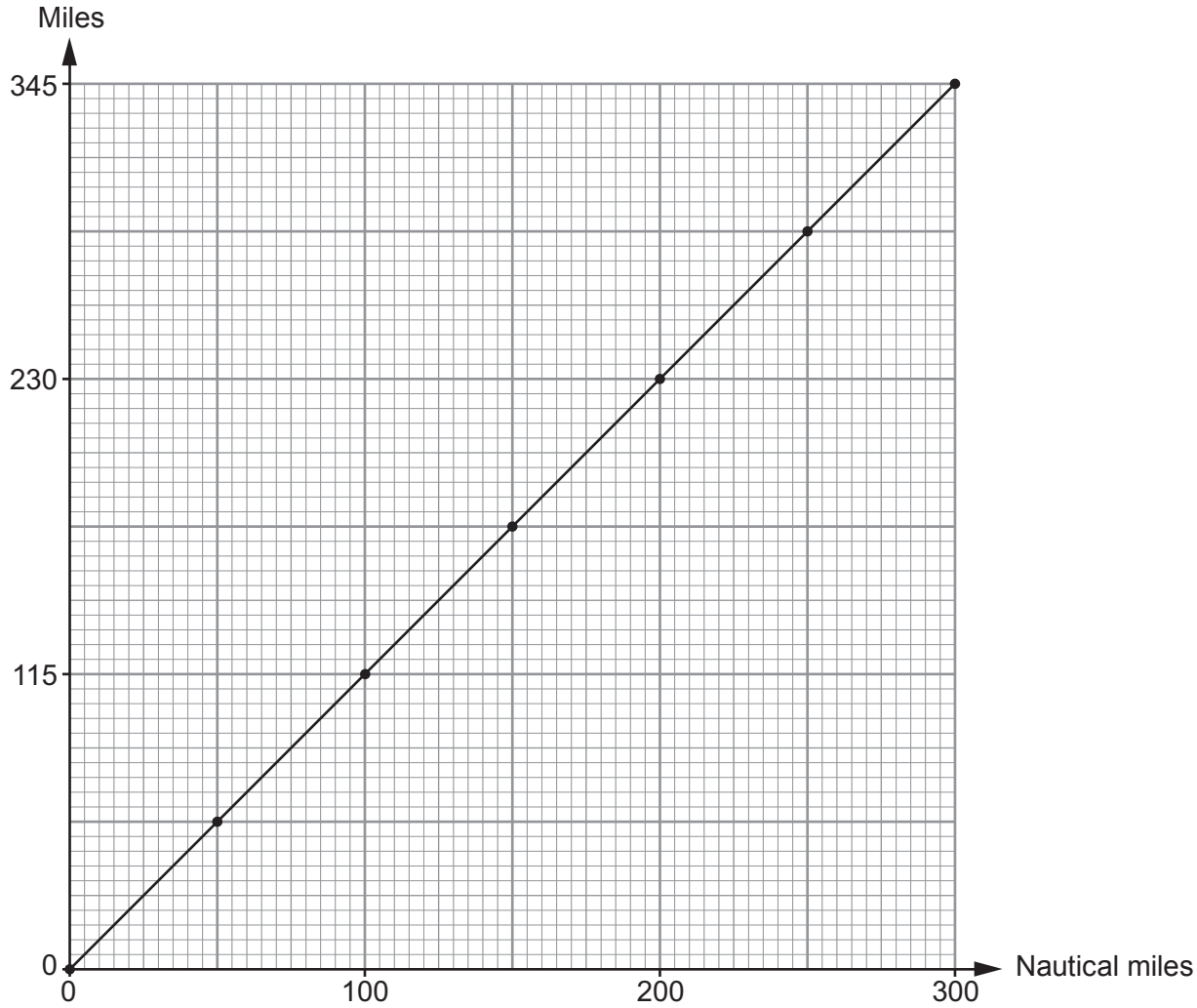
7. Maxim is doing a project on shipping.
He draws and uses his own conversion graph to convert between nautical miles and miles.



(a) What is 50 nautical miles converted into miles?
Circle your answer. [1]

55 56·5 57·5 58·5 59·5

100 nautical miles = 115 miles, so 50 nautical miles = 115 ÷ 2 = 57.5 miles

(b) Complete the following statement.

800 nautical miles is equal to ....920.... miles. [2]

200 nautical miles = 230 miles

800 = 4 × 200, so 800 nautical miles = 4 × 230 = 920 miles

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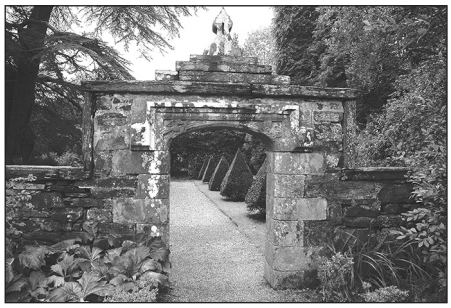

Mr and Mrs Blanc have 3 children, Valerie, Theo and Anton. The family is visiting Wales.
Valerie and Theo are 14-year-old twins.
Anton is 2 years old.

They visit Castell Gwynhir ruins and gardens.

A copy of the entrance board is shown below.

Castell Gwynhir ruins and gardens		
	Standard charge	Charge with 10% contribution towards improvements
Adult	£5.60	£6.40
Child – age 3 to 16	£2.30	£2.53
Child – under 3	Free	Free

(a) The family decides to pay the standard charges to visit Castell Gwynhir.
How much change will they get from £20?
You must show all your working. [3]

Adults (Mr and Mrs Blanc): 2 × £5.60 = £11.20

Children aged 3 to 16 (Valerie and Theo): 2 × £2.30 = £4.60

Anton is under 3, so he is free

Total cost = £11.20 + £4.60 = £15.80

Change = £20 − £15.80 = £4.20

They will get £4.20 change.

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(b) Theo looks at the charges with a 10% contribution towards improvements.

Theo says,
'The adult charge with an extra 10% is not right. It is too high!'

By how much is the adult charge too high?
You must show all your working. [3]

10% of £5.60 = £5.60 ÷ 10 = £0.56

Adult charge with an extra 10% = £5.60 + £0.56 = £6.16

The board says £6.40

Too high by £6.40 − £6.16 = £0.24

The adult charge is 24p too high.

(c) The gardens at Castell Gwynhir cover an area of 714 000 m^2.

Water ponds cover $\frac{2}{7}$ of the area of the gardens.

Calculate the area covered by water ponds. [2]

714 000 ÷ 7 = 102 000

102 000 × 2 = 204 000

Area covered by water ponds is 204 000 m^2

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9. The tables below show all of the international football results for Wales in 1984 and 1985.

1984

28 Feb 1984	**Scotland**		**2 – 1**		**Wales**
2 May 1984	**Wales**		**1 – 0**		**England**
22 May 1984	**Wales**		**1 – 1**		**Northern Ireland**
6 Jun 1984	**Norway**		**1 – 0**		**Wales**
10 Jun 1984	**Israel**		**0 – 0**		**Wales**
12 Sep 1984	**Iceland**		**1 – 0**		**Wales**
17 Oct 1984	**Spain**		**3 – 0**		**Wales**
14 Nov 1984	**Wales**		**2 – 1**		**Iceland**

1985

26 Feb 1985	**Wales**		**1 – 1**		**Norway**
27 Mar 1985	**Scotland**		**0 – 1**		**Wales**
30 Apr 1985	**Wales**		**3 – 0**		**Spain**
5 Jun 1985	**Norway**		**4 – 2**		**Wales**
10 Sep 1985	**Wales**		**1 – 1**		**Scotland**
16 Oct 1985	**Wales**		**0 – 3**		**Hungary**

Geraint says,
'On **average**, the Wales international football team scored more goals per match in 1985 than in 1984.'

(a) In checking the truth of Geraint's statement, why would it **not** be helpful to consider the **range** of the number of goals scored per match in each year? [1]

The range is not an average. It only shows the difference between the highest and lowest number of goals, so it does not take all the goals into consideration.

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(b) (i) By considering the **mean** number of goals scored per match by Wales each year, is Geraint's statement true?
You must show calculations for each year to support your answer. [3]

1984: goals scored by Wales = 1 + 1 + 1 + 0 + 0 + 0 + 0 + 2 = 5

in 8 matches, so mean = 5 ÷ 8 = 0.625 goals per match

1985: goals scored by Wales = 1 + 1 + 3 + 2 + 1 + 0 = 8

in 6 matches, so mean = 8 ÷ 6 = 1.33... goals per match

1.33... is more than 0.625 (more than 1 compared with less than 1)

so yes, Geraint's statement is true.

(ii) Give **one** reason why this method does not necessarily show that the Wales international football team results were better in 1985 than in 1984. [1]

It does not consider the goals scored against Wales, and Wales

played different teams (and a different number of matches)

in the 2 years.

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10. *(a)* The towns of Aberglen, Bargwyn, Caerlow and Derwen are on Bus Route 3.
The times buses take to travel between each of the towns are shown on the diagram below.

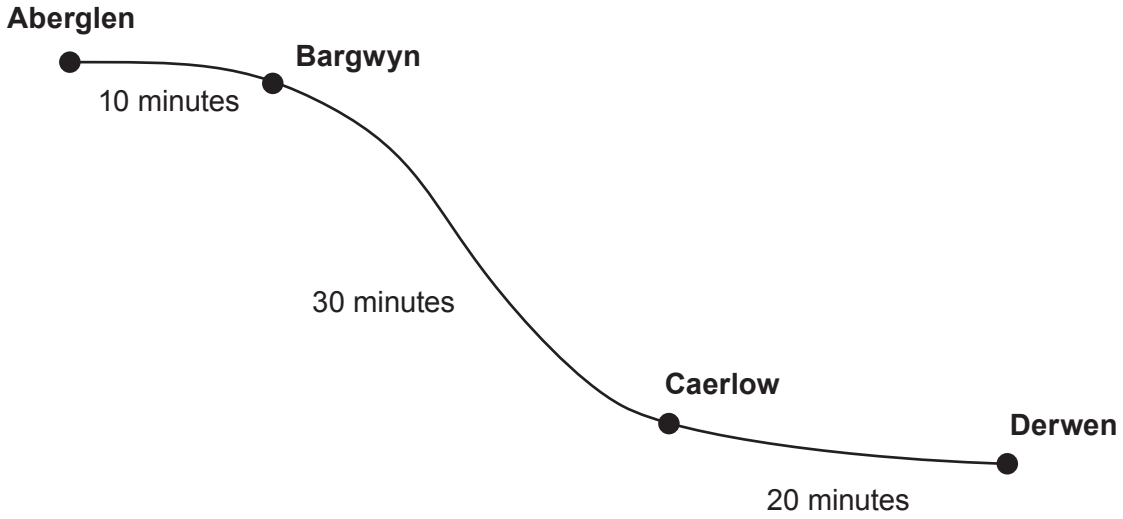

Diagram not drawn to scale

Buses start at Aberglen.
All these buses travel to Derwen, stopping at Bargwyn and Caerlow.

Here is the bus timetable.

Departing from:	Times
Aberglen	First bus leaves at 09:00, then every 13 minutes after this time.

At what time does the 09:13 bus from Aberglen arrive at Derwen?
Circle your answer. [1]

09:23 09:33 09:43 10:53 10:13

09:13 + 10 + 30 + 20 minutes = 09:13 + 60 minutes = 10:13

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(b) From Grainsey, the Number 6 bus runs to Wyndre and the Number 7 bus runs to Hafgoch.

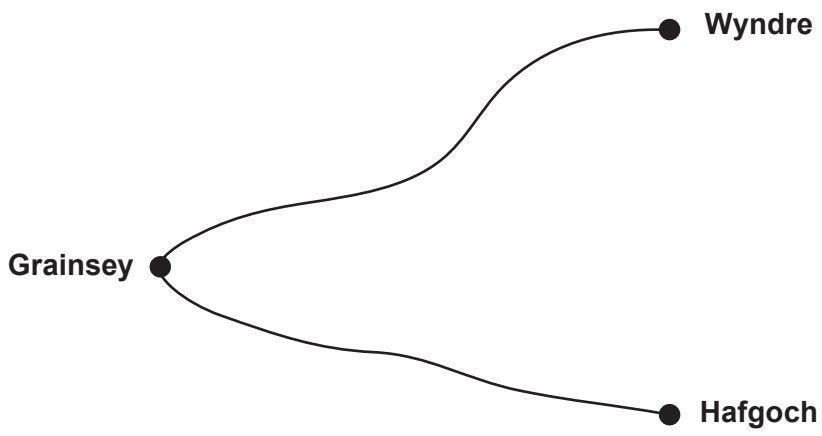

Diagram not drawn to scale

The timetable for these buses is given below:

Bus Number	To	Times
6	Wyndre	First bus leaves at 10:00, then every 20 minutes after this time.
7	Hafgoch	First bus leaves at 10:00, then every 45 minutes after this time.

After 10:00, when will the Number 6 bus and the Number 7 bus next leave Grainsey at the same time? [4]

Bus 6 (every 20 min): 10:00, 10:20, 10:40, 11:00, 11:20, 11:40,

12:00, 12:20, 12:40, 13:00

Bus 7 (every 45 min): 10:00, 10:45, 11:30, 12:15, 13:00

Check: $20 = 2 \times 2 \times 5$, $45 = 3 \times 3 \times 5$

LCM $= 2 \times 2 \times 3 \times 3 \times 5 = 180$ minutes $= 3$ hours

10:00 + 3 hours = 13:00

They next leave Grainsey at the same time at 13:00 (1 p.m.)

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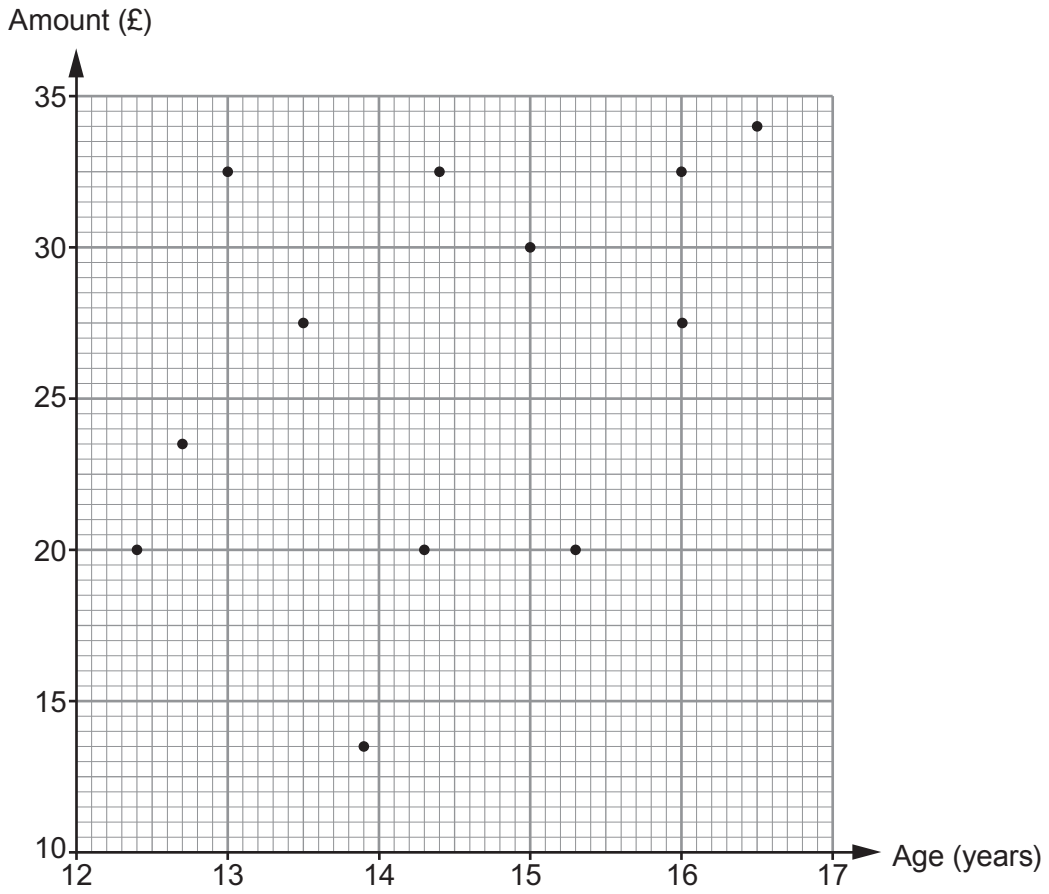
11. Lekan's parents have complained that they are paying too much towards his mobile phone bill each month.

Lekan decides to ask a number of students in school how much their parents or carers pay towards their mobile phone bills each month.
He displays the results in a scatter diagram. These include his own results.



(a) Lekan's parents want to know the names of some of these students.

The two 15-year-old students are Harriet and Eleri.
Eleri is older than Harriet.

Gwilym and Aled's parents each pay £27.50 per month.
Aled is younger than Gwilym.

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(i) Complete each of the following statements. [2]

'Eleri's parents or carers pay £ 20 each month towards her mobile phone bill.'

'Harriet's parents or carers pay £ 30 each month towards her mobile phone bill.'

(ii) Complete each of the following statements. [3]

'Gwilym is 16 years 0 months old.'

'Aled is 13 years 6 months old.'

(b) Lekan's parents pay £32.50 per month towards his mobile phone bill.
He is the youngest of the 3 students who receive £32.50 per month towards their mobile phone bill.

(i) How old is Lekan? [1]

13 years old

(ii) Do you think Lekan's parents are right to complain that they are paying too much towards his mobile phone bill each month?
You must use the scatter diagram to give a reason for your answer. [1]

Yes ✓ No ☐

Yes. Only 3 other students get the same or more (£32.50, £32.50 and £34). Most students get less, even older ones, e.g. the 15 year old who gets £20 and the 16 year old who gets £27.50.

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12. Sam is making a large pot of cheese sauce for a party.
Sam uses the conversions

- 1 ounce ≈ 28 grams,
- 1 pint ≈ 568 millilitres.

He wants to write the following recipe ingredients in grams and millilitres.

Cheese sauce

Ingredients:

4 ounces of butter

$3\frac{1}{2}$ ounces of flour

3 pints of milk

9 ounces of cheese

Using Sam's conversions, complete the ingredient table below. [4]

Butter: 4 × 28 = 112 g

Flour: 3½ × 28 = 3 × 28 + ½ × 28 = 84 + 14 = 98 g

Milk: 3 × 568 = 1704 ml

Cheese: 9 × 28 = 252 g

Cheese sauce

Ingredients:

112 grams of butter

98 grams of flour

1704 millilitres of milk

252 grams of cheese

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