Surname	StemUp Model Solution	Centre Number	Candidate Number
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GCSE – NEW

3310U20-1

S17-3310U20-1

MATHEMATICS – NUMERACY
UNIT 2: CALCULATOR-ALLOWED
FOUNDATION TIER

THURSDAY, 8 JUNE 2017 – MORNING

1 hour 30 minutes

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

ADDITIONAL MATERIALS

A calculator will be required for this paper.

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

INSTRUCTIONS TO CANDIDATES

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

You may use a pencil for graphs and diagrams only.

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

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

If you run out of space, use the continuation page at the back of the booklet, taking care to number the question(s) correctly.

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

INFORMATION FOR CANDIDATES

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

Unless stated, diagrams are not drawn to scale.

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

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

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

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CJ*(S17-3310U20-1)

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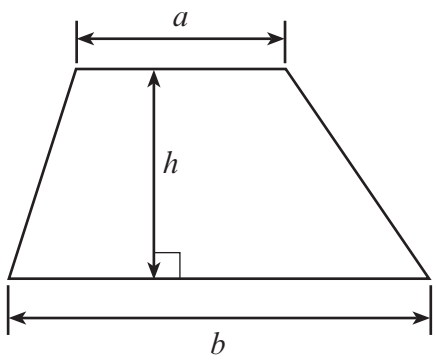
Formula List - Foundation Tier

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



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1. The chart below shows the road distances between some towns and cities.
The distances are given in miles.

Abergavenny			
18	**Newport**		
45	53	**Gloucester**	
50	32	36	**Bristol**

Wyn lives in Abergavenny and works in Bristol.

(a) Use the chart to find the road distance from Abergavenny to Bristol. [1]

50 miles

(b) Wyn works in Bristol for 5 days each week.
Each day, he drives to and from work using the route shown on the map.

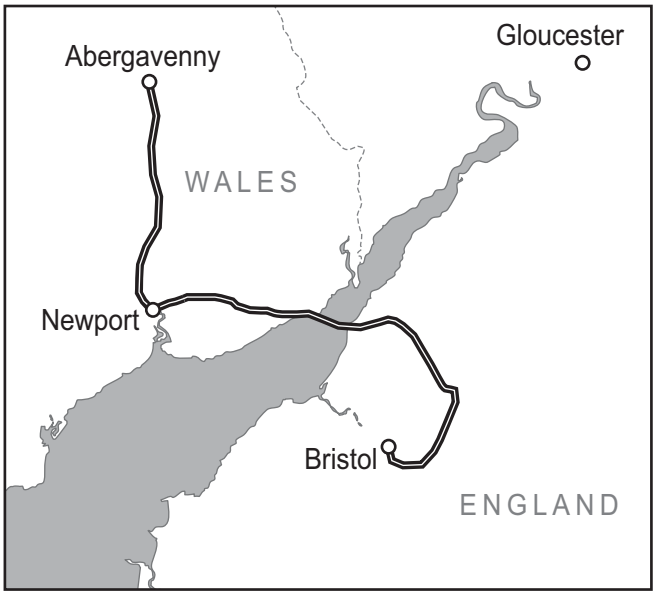

Diagram not drawn to scale

How many miles, in total, does he travel to and from work each week? [2]

Abergavenny to Bristol via Newport = 18 + 32 = 50 miles

Each day (there and back) = 2 × 50 = 100 miles

Each week = 5 × 100 = 500 miles

He travels 500 miles in total each week.

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(c) One day, Wyn had to use a different route through Gloucester to get to and from work.

Alternative Route

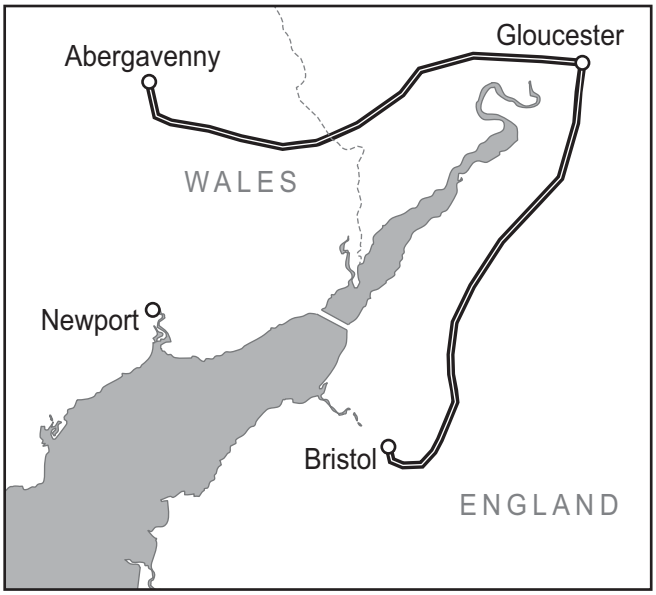

Diagram not drawn to scale

Use the chart to work out how many **extra** miles Wyn travelled that day.
You must show all your working. [4]

Abergavenny to Gloucester = 45 miles

Gloucester to Bristol = 36 miles

Alternative route one way = 45 + 36 = 81 miles

Usual route one way = 50 miles

Extra one way = 81 − 50 = 31 miles

Extra there and back = (81 − 50) × 2 = 31 × 2 = 62 miles

Wyn travelled 62 extra miles that day.

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2. *(a)* David and Gwyn have decided to take part in a charity running event.
They both ordered some new running kit from an online discount store.

A pair of trainers	A pair of socks	A pair of leggings
£39.99	£2.99	£12.90
A running vest	**A pair of shorts**	**A water bottle**
£15.50	£11.98	£6.00

(i) David ordered the following items:
- 1 pair of trainers,
- 2 pairs of shorts,
- 3 pairs of socks.

What was the total cost of these items?
You must show all your working. [3]

1 pair of trainers = £39.99

2 pairs of shorts = 2 × £11.98 = £23.96

3 pairs of socks = 3 × £2.99 = £8.97

Total cost = £39.99 + £23.96 + £8.97

= £72.92

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(ii) The discount store has a delivery charge of £6.99 for all orders under £100.
For all orders of £100 or over, delivery is free.
Gwyn calculated that the cost of the items in his order would be £96.62.

Explain how Gwyn would actually save money by adding two pairs of socks to his order.

You must show all your working. [3]

Without socks: £96.62 is under £100, so delivery is charged.

Total = £96.62 + £6.99 = £103.61

With 2 pairs of socks: 2 × £2.99 = £5.98

Items = £96.62 + £5.98 = £102.60, which is over £100,

so delivery is free. Total = £102.60

Saving = £103.61 − £102.60 = £1.01

Adding the socks takes his order over £100, so there is no

delivery charge. The socks (£5.98) cost less than the

delivery charge (£6.99), so Gwyn saves £1.01 and gets

two extra pairs of socks.

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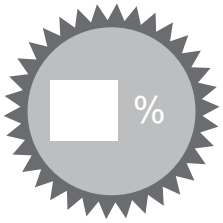
(b) David aims to raise £200 for his chosen charity.
He set up a "Sponsor me please" page on social media.
This is David's page at the end of the first week.
The percentage has been blanked out.

David's Page
David is raising money for a charity.
Please help him to reach his target of £200.

Donate

Current total raised £32.00



(i) How much more money did David need in order to reach his target? [1]

£200 − £32 = £168

(ii) David thought he had raised more than 15% of his target.
Was he correct?
Show your working. [2]

15% of £200 = 15/100 × 200 = £30

(32 ÷ 200 × 100 = 16%)

£32 is more than £30 (16% > 15%)

Yes, David was correct.

(iii) After two weeks, David had raised 57% of his target.
What percentage of his target was still to be raised? [1]

100% − 57% = 43%

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(c) David and Gwyn kept a training record as they prepared for the charity event.
They recorded the number of miles that they ran each day.
The mileage for week one is shown below.

	Mon	Tue	Wed	Thur	Fri	Sat	Sun
David	1	8	2	1	7	1	5
Gwyn	1	4	1	6	2	1	12

Gwyn thinks that his average daily mileage is greater than David's.
Explain why using the **medians** would not show this.
You must show all your working. [3]

David in order: 1, 1, 1, 2, 5, 7, 8

Median (4th value) = 2 miles

Gwyn in order: 1, 1, 1, 2, 4, 6, 12

Median (4th value) = 2 miles

Both medians are the same (2 miles), so the medians would not show that Gwyn's average daily mileage is greater than David's.

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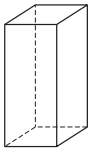
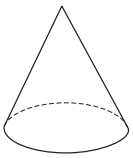
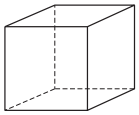
3. Delyth runs her own business making and selling candles.
She makes and sells four types of candle.

Type	Picture of candle	Diagram	Name of the 3-D solid	Volume of candle (cm^3)
A			Cuboid	240
B			Cylinder	283
C			CONE	270
D			CUBE	120

(a) Fill in the names of the 3-D solids in the table above. [2]

(b) Delyth uses a formula to work out the mass of wax that is needed to make one candle.

$$\text{Mass of wax in grams} = \frac{3 \times \text{volume of candle}}{5}$$

(i) What mass of wax will be needed to make a candle of type C? [2]

Mass = (3 × 270) ÷ 5 = 810 ÷ 5

= 162 g

Mass of the wax of a candle of type C is 162 grams

(ii) Delyth has enough wax to make 50 candles of type A.
How many type D candles can she make with the same amount of wax? [2]

Wax for 50 type A = 50 × (3 × 240 ÷ 5) = 50 × 144 = 7200 g

Wax for 1 type D = 3 × 120 ÷ 5 = 72 g

Number of type D = 7200 ÷ 72 = 100 candles

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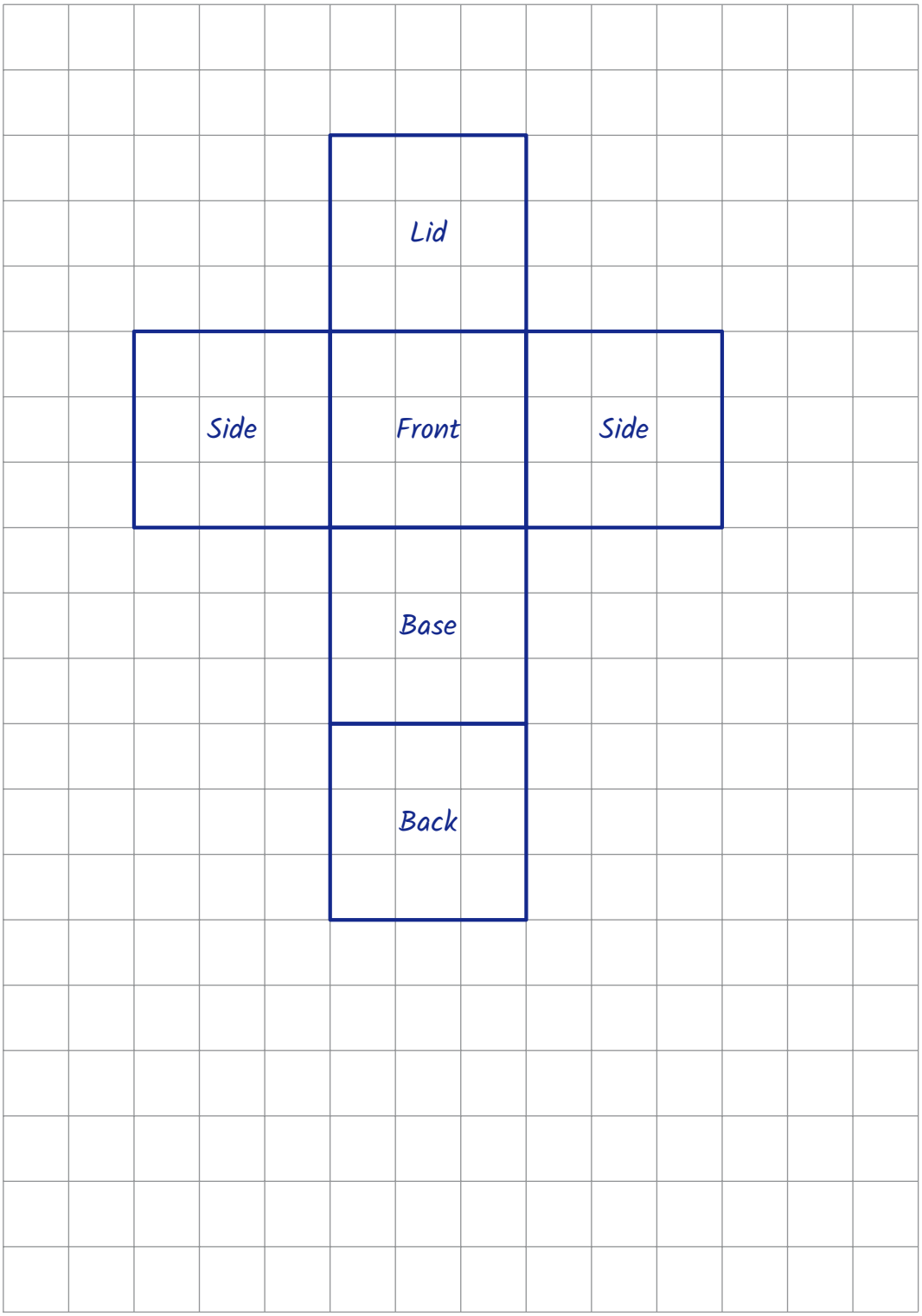
(c) Delyth also makes small candles.
One of these candles fits in a box with a lid.
The box is a cube with sides of length 3 cm.
Use the centimetre squared paper to draw a net of the box, including the lid. [2]



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

It costs Delyth £2.35 to make each small candle.
It costs 15p to make each box.

Delyth sells 20 candles, each in a separate box, for a total of £84.
How much profit does Delyth make?
You must show all your working. [3 + 2 OCW]

Cost to make one candle = £2.35

Cost to make one box = 15p = £0.15

Cost of one candle in a box = £2.35 + £0.15 = £2.50

Cost of 20 candles in boxes = 20 × £2.50 = £50.00

Money from selling 20 candles = £84.00

Profit = money received − total cost

Profit = £84.00 − £50.00 = £34.00

Delyth makes a profit of £34.

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4.

Bus timetable from Orme Station to Outlet Village

Only 55 minutes from Orme Station direct to Outlet Village.

Buses leave the station
- every 12 minutes from 8 a.m. until 12 noon
- every 24 minutes from 12 noon until 10 p.m.

(a) At what time does the first bus after 09:00 leave Orme Station?
Circle your answer. [1]

09:05 09:12 09:18 09:24 09:30

(b) Gwil looks at the timetable shown above.
He decides to take the latest possible bus to be at Outlet Village by 15:00.

At what time will Gwil arrive at Outlet Village?
You must show all your working. [2]

From 12 noon buses leave every 24 minutes:

12:00, 12:24, 12:48, 13:12, 13:36, 14:00, 14:24

14:24 + 55 min = 15:19, which is too late

14:00 + 55 min = 14:55, which is before 15:00

Gwil catches the 14:00 bus.

Gwil arrives at Outlet Village at 14:55

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5. Luigi lives in south Wales.
Rosina lives in west Wales.
For each of the first 65 days of 2017, they recorded whether or not it rained.

Luigi recorded that it rained on 28 of these days.
Rosina recorded that it rained on 40% of these 65 days.

Luigi says,

'For the first 65 days of 2017, there were more days with rain where I live than where Rosina lives.'

Is Luigi correct?
You must show all your working. [3]

Luigi (south Wales): rain on 28 days

Rosina (west Wales): 40% of 65 = 0.4 × 65 = 26 days

28 days > 26 days

(Luigi: 28 ÷ 65 × 100 = 43.07...% which is more than 40%)

Yes, Luigi is correct. It rained on more days where he lives.

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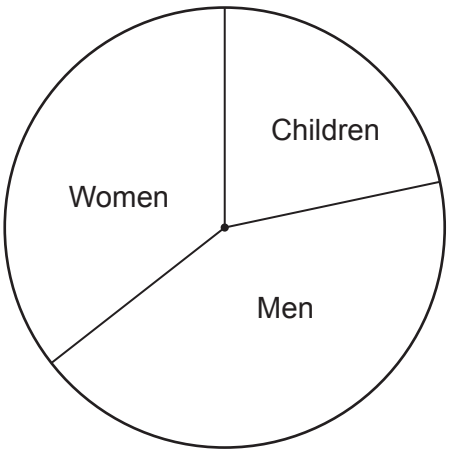
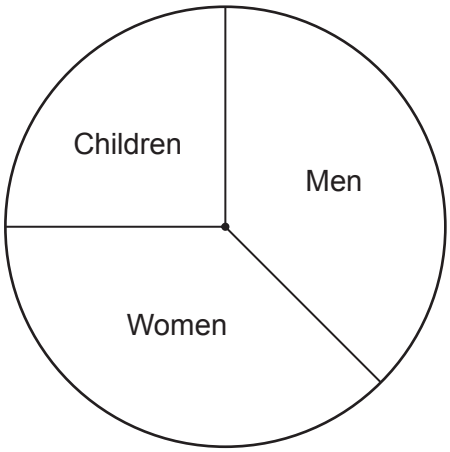
6. Tomos is looking at gym memberships for *Hadon's Gym* and *Workout Palace*.
Each of these gyms displays its membership in a pie chart.

Hadon's Gym	*Workout Palace*
	

(a) About what percentage of the members at *Hadon's Gym* are children?
Circle your answer. [1]

10% 20% 30% 40% 50%

(b) Which of the following is the best estimate for the percentage of the members at *Workout Palace* who are women?
Circle your answer. [1]

25% 28% 30% 32% 38%

(c) Tomos says,
'There are more men with membership at *Hadon's Gym* than at *Workout Palace*.'

Is Tomos **certain** to be correct?
You must give a reason for your answer. [1]

Yes ☐ No ☑

No. The pie charts only show proportions (percentages), not the number of members. We don't know how many members are in each gym in total, so Workout Palace could be a much bigger gym with more men.

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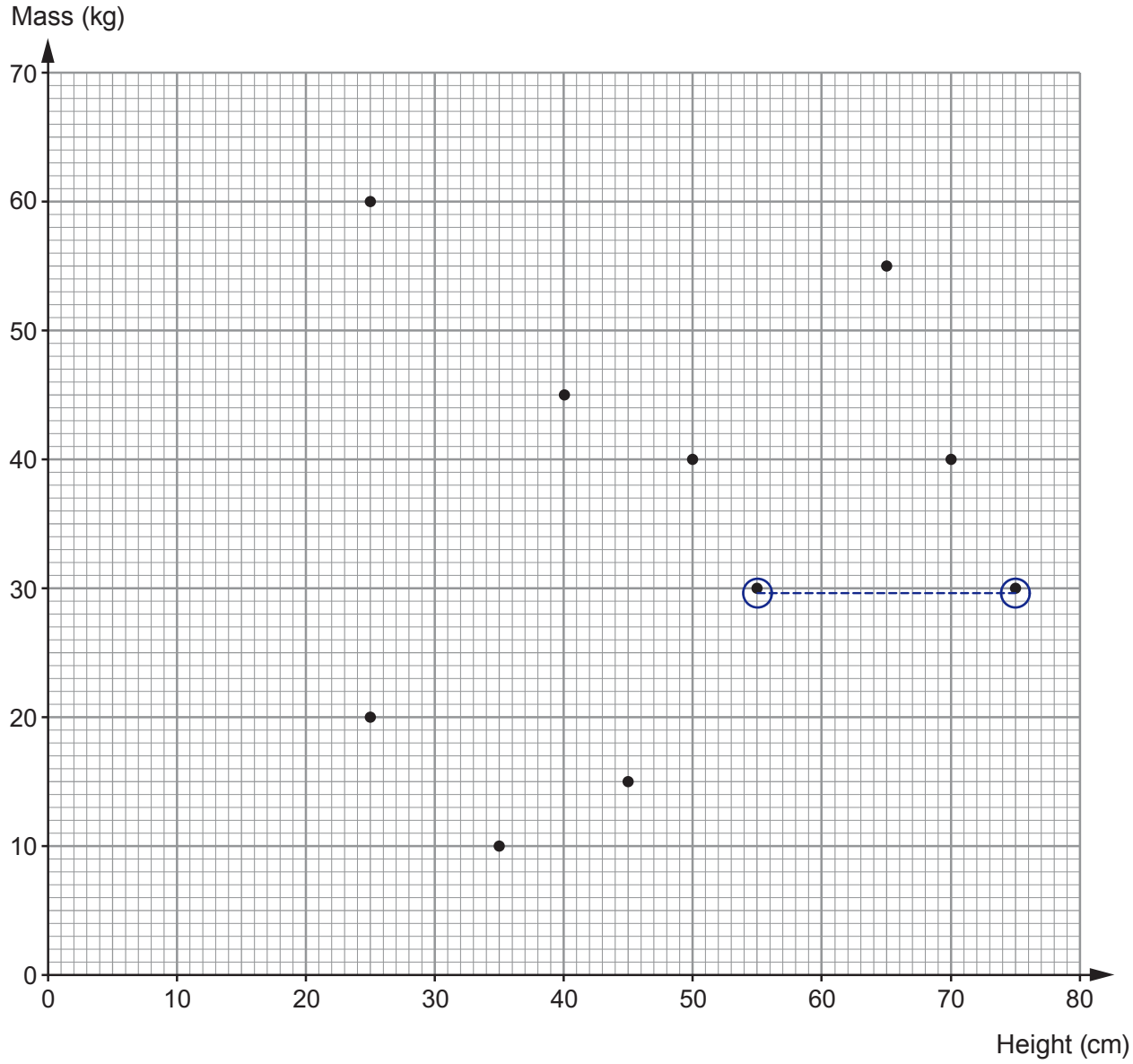
7. A group of friends measured the heights and masses of their pets.
The scatter diagram shows the results.



(a) Describe the correlation shown by this scatter diagram. [1]

No correlation

(b) The friends notice that the tallest pet has the same mass as another pet.
What is the height of this other pet? [1]

55 cm

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8. Glenda plans to drive from Flint to Cardiff.

On a long journey, her average speed is usually 42 mph.

Last time she drove from Flint to Cardiff it took her $3\frac{1}{2}$ hours.

(a) Use this information to calculate the distance between Flint and Cardiff. [2]

Distance = average speed × time

= 42 × 3½

= 42 × 3.5 = 147 miles

147 miles

(b) Give a possible reason why your answer in *(a)* is only an estimate of the distance between Flint and Cardiff. [1]

Her average speed might not be 42 mph for this journey,

e.g. the traffic could be different, and 3½ hours might

not have been exactly 3½ hours.

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9. Gustav is making some scones for his sister's birthday party.

Recipe to make **12 scones**

450 g self raising flour
2 teaspoons of baking powder
75 g butter
50 g caster sugar
2 eggs
225 ml milk

Bake at **428°F** for 10 to 15 minutes

(a) How much self raising flour will Gustav need to make 30 scones?
Circle your answer. [1]

900 g 1000 g 1100 g 1125 g 1350 g

(b) In the recipe, the temperature of the oven is given in degrees Fahrenheit, *F*.
The temperature gauge on Gustav's oven shows degrees Celsius, *C*.

The formula below is used to convert Fahrenheit into Celsius.

$$C = \frac{5F - 160}{9}$$

At what temperature should Gustav bake the scones?
Give you answer in degrees Celsius. [2]

$C = \frac{5 \times 428 - 160}{9} = \frac{2140 - 160}{9} = \frac{1980}{9} = 220$

Gustav should bake the scones at 220 °C.

220 °C

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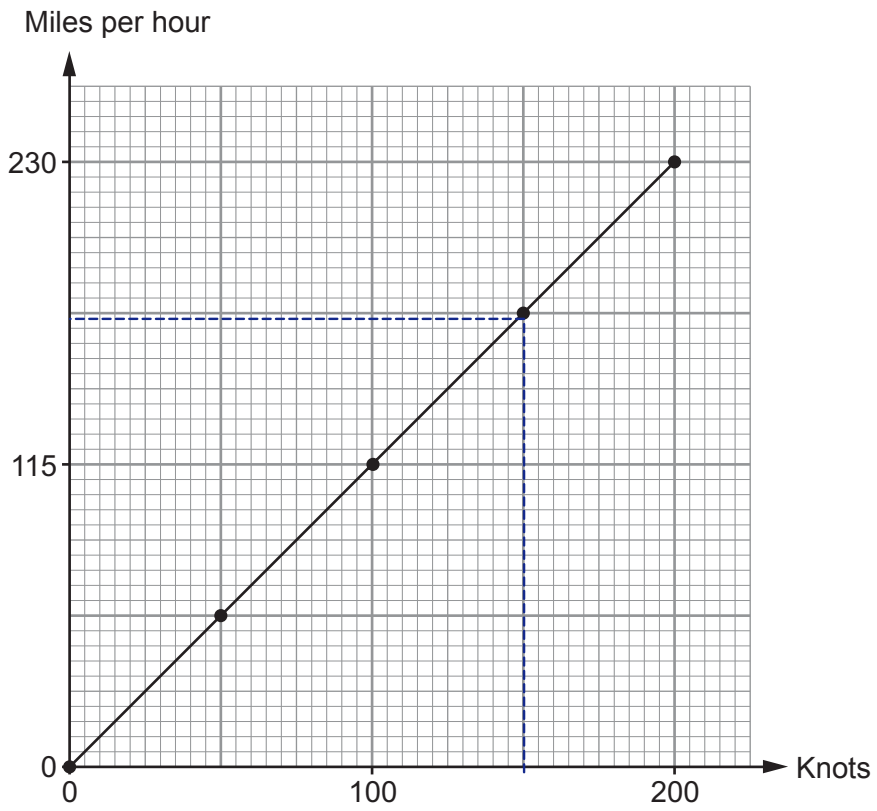
10. Alun has made his own conversion graph to change knots to miles per hour.



(a) Use Alun's conversion graph to write 150 knots in miles per hour. [1]

Reading up from 150 knots and across:

150 knots = 172.5 miles per hour

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(b) Nikita thinks Alun's conversion graph may be inaccurate.

Nikita knows that 1000 knots is 1150.779 miles per hour, correct to 3 decimal places.

Convert 20 knots to miles per hour
- using Alun's conversion graph, and then
- using Nikita's values.

Calculate the difference, in miles per hour, between your answers.
Give your answer correct to 2 decimal places.
You must show all your working. [4]

Alun's graph: 200 knots = 230 mph

20 knots = 230 ÷ 10 = 23 mph

Nikita's values: 1000 knots = 1150.779 mph

20 knots = 20 × 1150.779 ÷ 1000 = 23.01558 mph

Difference = 23.01558 − 23 = 0.01558 mph

= 0.02 mph (to 2 decimal places)

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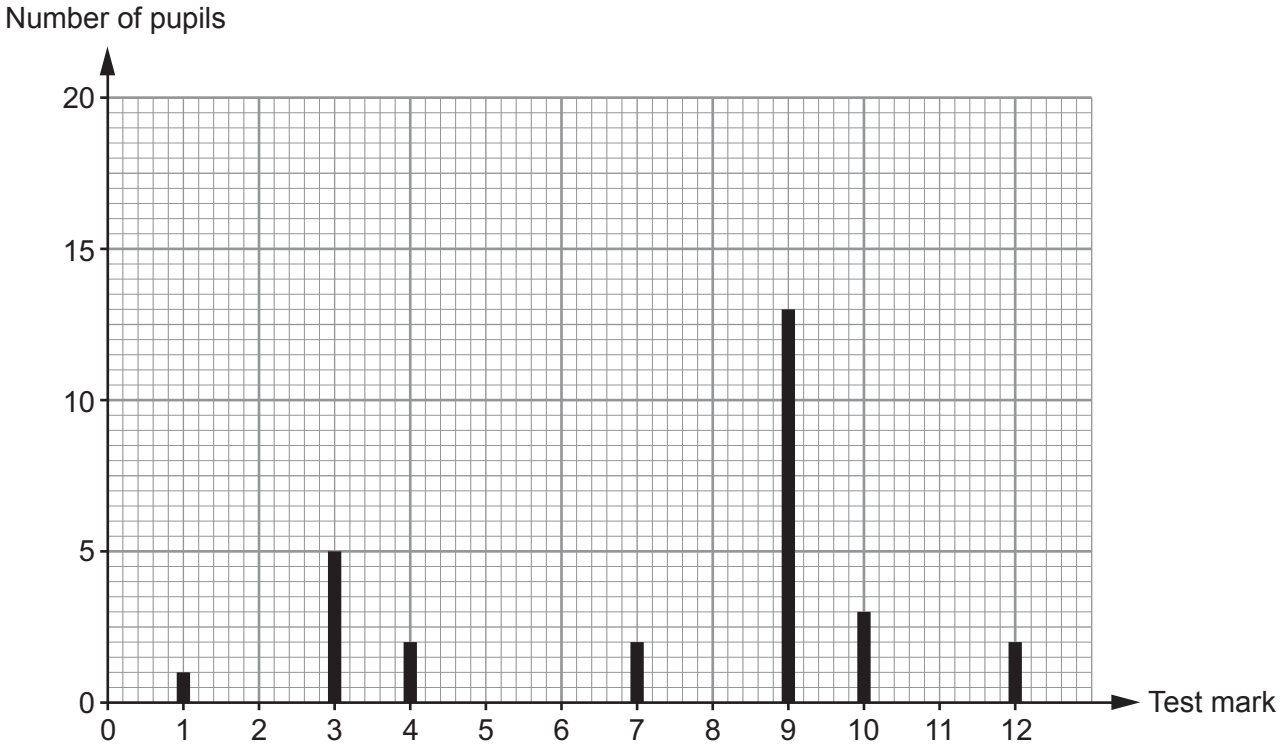
11. *(a)* Miss Rashud gave her Year 9 French class a test on Wednesday.
She asked her class to spell 12 different words.

She displays the results as shown below.

Year 9 results



(i) How many pupils scored **more than 9** in the test? [1]

3 + 2 = 5 pupils

(ii) How many pupils are there in Miss Rashud's French class? [1]

1 + 5 + 2 + 2 + 13 + 3 + 2 = 28 pupils

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

That every pupil in the class took the test,

i.e. no one was absent on Wednesday.

(b) Miss Rashud also gave the same test to her Year 10 French class on Wednesday.
She asked her class to spell the same 12 words.

She displays the results as shown opposite.

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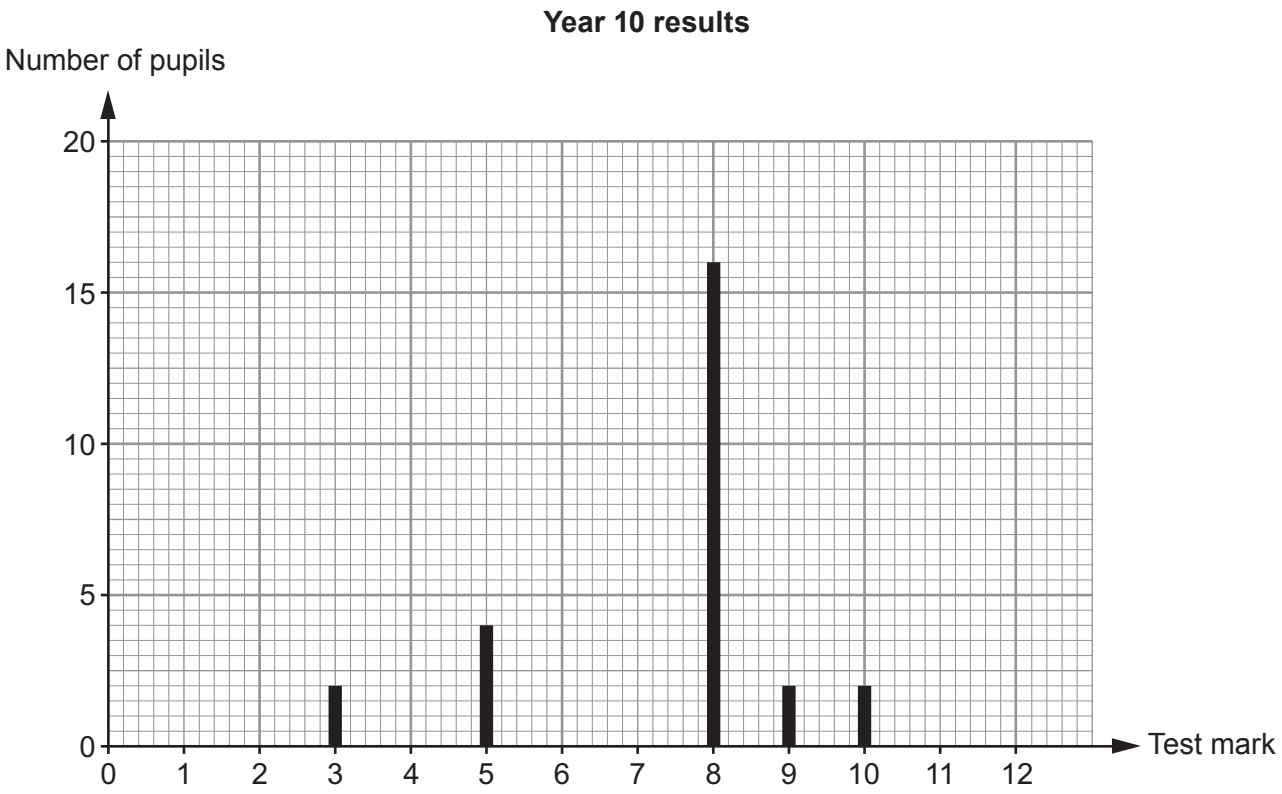

Catrin looks at the two sets of data Miss Rashud has displayed.
She says,

'Year 10 are better at spelling than Year 9.'

Is Catrin's statement correct?
You must give values to support your answer. [1]

Catrin is correct ☐ Catrin is incorrect ☑

18 Year 9 pupils scored 9 or more, but only 4 Year 10 pupils scored 9 or more. Year 9 mode = 9 marks, Year 10 mode = 8 marks, so Year 9 did better. Catrin is incorrect.

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12. *Organics4U* is a company based in Wales that delivers organic products.
Organics4U has 16 vehicles on the road every working day.
The company has 6 vans and 10 trucks.

Ffion has the following information for each type of vehicle.

Type of vehicle	Average distance travelled per litre (km per litre)	Average distance travelled per day (km per day)
Van	8	256
Truck	5·5	704

The fuel used by all of the 16 vehicles costs £1.10 per litre.
Use this information to calculate the **total** fuel bill for 1 working day.
You must show all your working. [6]

Fuel used by 1 van per day = 256 ÷ 8 = 32 litres

Fuel used by 6 vans = 6 × 32 = 192 litres

Cost for 6 vans = 192 × £1.10 = £211.20

Fuel used by 1 truck per day = 704 ÷ 5.5 = 128 litres

Fuel used by 10 trucks = 10 × 128 = 1280 litres

Cost for 10 trucks = 1280 × £1.10 = £1408.00

Total fuel bill = £211.20 + £1408.00

= £1619.20

The total fuel bill for 1 working day is £1619.20

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