Surname	Centre Number	Candidate Number
First name(s)		0

GCSE

3310U20-1

A20-3310U20-1

THURSDAY, 5 NOVEMBER 2020 – MORNING

MATHEMATICS – NUMERACY
UNIT 2: CALCULATOR-ALLOWED
FOUNDATION TIER

1 hour 30 minutes

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1.	**6**	
2.	**20**	
3.	**6**	
4.	**5**	
5.	**5**	
6.	**7**	
7.	**10**	
8.	**6**	
Total	**65**	

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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 additional page at the back of the booklet. Question numbers must be given for the work written on the additional page.

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

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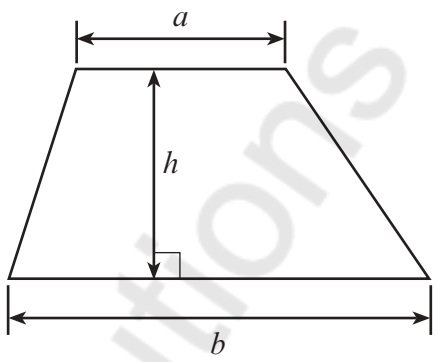
Formula List – Foundation Tier

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



Examiner only

1. *(a)* It is said that, in 1823, a schoolboy called William Webb Ellis caught the ball during a game of football and ran with it. He created a new sport called rugby.
How many years ago did William Webb Ellis catch the ball? [1]

=> Year 2020 − Year 1823

=> 2020 − 1823 => 197 (years)

2020
− 1823
197

(b) The total number of points scored by a team in a rugby game can be calculated using the following formula.

Total points = number of tries scored × 5
+
number of conversions kicked × 2
+
number of penalties kicked × 3
+
number of drop goals kicked × 3

At the end of the game, the team with the most points is the winner.
Two schools, *Ysgol Abergwyn* and *Ysgol Llanbro*, played a rugby game.
Ysgol Abergwyn scored 6 tries and kicked 4 conversions and 2 penalties.
~~*Ysgol Llanbro*~~ scored 7 tries and kicked 3 conversions, 1 penalty and 1 drop goal.

Using the formula above, calculate how many points each team scored.
Write down which team won the game and by how many points. [5]

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* For Abergwyn = (6 × 5) + (4 × 2) + (2 × 3) + (0 × 3)
= 30 + 8 + 6 + 0 = 30 + 14
= 44 points

* Llanbro = (7 × 5) + (3 × 2) + (1 × 3) + (1 × 3)
= 35 + 6 + 3 + 3 = 47 points

Ysgol Abergwyn scored 44 points

Ysgol Llanbro scored 47 points

Ysgol Llanbro won the game by 47 − 44 = 3 points

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2. Mr and Mrs Jones and their two children, Tomos and Siân, are planning a skiing holiday to Grenoble in France.

(a) Mrs Jones has been looking at the average monthly temperatures of Grenoble.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
–1°C	–2°C	2°C	5°C	9°C	12°C	15°C	16°C	10°C	3°C	–1°C	–2°C

(i) In how many months is the average monthly temperature below 6°C? [1]

Jan = -1°C, Feb = -2°C, Mar = 5°C, Apr, Oct = 3°C, Nov, Dec < 6°C

(1) (2) (3) (4) (5) (6)

Number of months = 7 (months)

6°C

< 6°C

⇒ Mar = 2°

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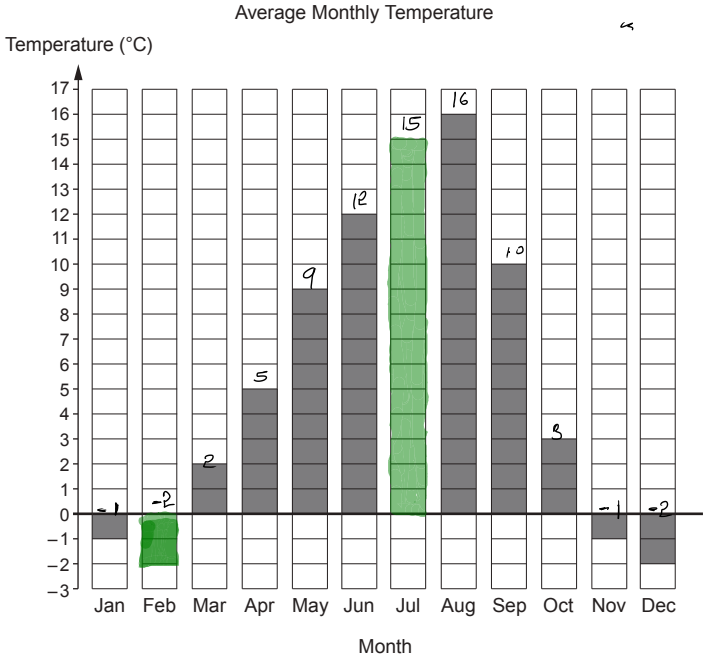
(ii) Complete the bar chart below for the months of February and July. [2]



(iii) Calculate the mean of the temperatures in the table. [3]

= Total temperature = 66°C

Mean = Total temperature / No of Month = 66°C / 12

= 5.5°C

Mean = $\frac{[(-1)+(-2)+2+5+9+12+15+16+10+3+(-1)+(-2)]}{12}$

= $\frac{-1-2+2+5+9+12+15+16+10+3-1-2}{12}$

= $\frac{5+9+12+15+16+10+3-4}{12}$

= $\frac{66}{12}$ = 5.5°C

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(b) The information below lists the dates, times and costs per person of the flights from Cardiff to Grenoble and from Grenoble to Cardiff.

Mr Jones has circled a flight on the information below.
The flight departs from Cardiff at 08:10 and arrives in Grenoble at 10:55.
This flight costs £63.22 **for one person**.
This cost does not include any additional charges.

Cardiff to Grenoble

Saturday 26 Dec	Sunday 27 Dec	Monday 28 Dec
Dep 06:10 Arr 08:55 **£35.75**	Dep 06:00 Arr 08:45 **£87.46**	Dep 06:10 Arr 08:55 **£30.09**
Dep 07:25 Arr 10:10 **£22.82**	Dep 07:15 Arr 09:55 **£74.94**	Dep 08:10 Arr 10:55 **£30.90**
Dep 08:10 Arr 10:55 **£23.63**	Dep 08:10 Arr 10:55 **£63.22**	Dep 09:05 Arr 11:50 **£30.90**
Dep 10:45 Arr 13:25 **£26.86**	Dep 09:50 Arr 12:35 **£91.50**	Dep 10:45 Arr 13:25 **£34.94**
Dep 12:40 Arr 15:20 **£30.90**	Dep 11:35 Arr 14:15 **£98.57**	Dep 12:00 Arr 14:35 **£30.90**

Grenoble to Cardiff

Saturday 2 Jan	Sunday 3 Jan	Monday 4 Jan
Dep 07:00 Arr 07:35 **£11.03**	Dep 07:00 Arr 07:35 **£30.02**	Dep 07:00 Arr 07:35 **£11.84**
Dep 09:30 Arr 10:05 **£18.91**	Dep 09:25 Arr 10:00 **£34.06**	Dep 09:30 Arr 10:05 **£40.12**
Dep 10:45 Arr 11:20 **£13.05**	Dep 11:10 Arr 11:50 **£149.60**	Dep 10:50 Arr 11:25 **£59.51**
Dep 11:25 Arr 12:05 **£11.84**	Dep 13:15 Arr 13:55 **£58.30**	Dep 12:30 Arr 13:10 **£67.19**
Dep 14:00 Arr 14:40 **£43.15**	Dep 14:10 Arr 14:50 **£38.30**	Dep 14:00 Arr 14:40 **£66.38**

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(i) A flight departs from Grenoble at 14:00 on Saturday, 2 January.
How much does this flight cost for one person?
Circle your answer. [1]

£11.84 £43.15 £66.38 £38.30 £63.22

(ii) Mr Jones decides to book the flight he has circled.
He also books a return flight from Grenoble to Cardiff, departing on Monday, 4 January.
The total cost of both flights is £122.73 for one person.
This cost does not include any additional charges.

Complete the table below to show the details of the return flight that Mr Jones booked.

[2]

Departing time => 10:50

Arrival time => 11:25

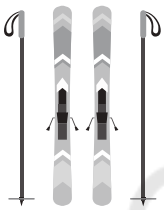
Return flight from Grenoble to Cardiff	
Date	Monday, 4 January
Departing time	10:50
Arrival time	11:25
Cost	£ 59.51

Examiner only

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

Mr Jones books the flights for himself, his wife, Tomos and Siân.
The flights to and from Grenoble will cost **each person** £122.73 in total.
There are some additional charges for the luggage they will need to take.
Mr Jones sees the information below on the airline website.

ADDITIONAL CHARGES

26 kg bag £29.61 **PER FLIGHT**	SET OF SKIS £37.00 **PER FLIGHT**	SNOWBOARD £39.00 **PER FLIGHT**
		

On **both** flights, the family wish to take:

- four 26 kg bags,
- one set of skis,
- three snowboards.

What would be the total cost for the Jones family to fly **to and from** Grenoble, including these additional charges?
You must show all your working. [6 + 2 OCW]

* Four 26 kg bags => 4 x 29.61 = £118.44
to and from Grenoble => 2 x £118.44 => £236.88
* One set of skis => £37
to and from Grenoble => 2 x £37 => £74
* Three Snowboards => 3 x £39 = £117
to and from Grenoble => 2 x £117 = £234
* Cost of family => 4 x £122.73 = £490.92

Total for both journey => 236.88 + 74 + 234 + 490.92
= £1035.8

Examiner only

(d) Tomos wants to take his rucksack on the flight.
He does not have to pay if the dimensions of the rucksack are not greater than

56 cm by 45 cm by 25 cm.

Tomos measures his rucksack.
The dimensions are

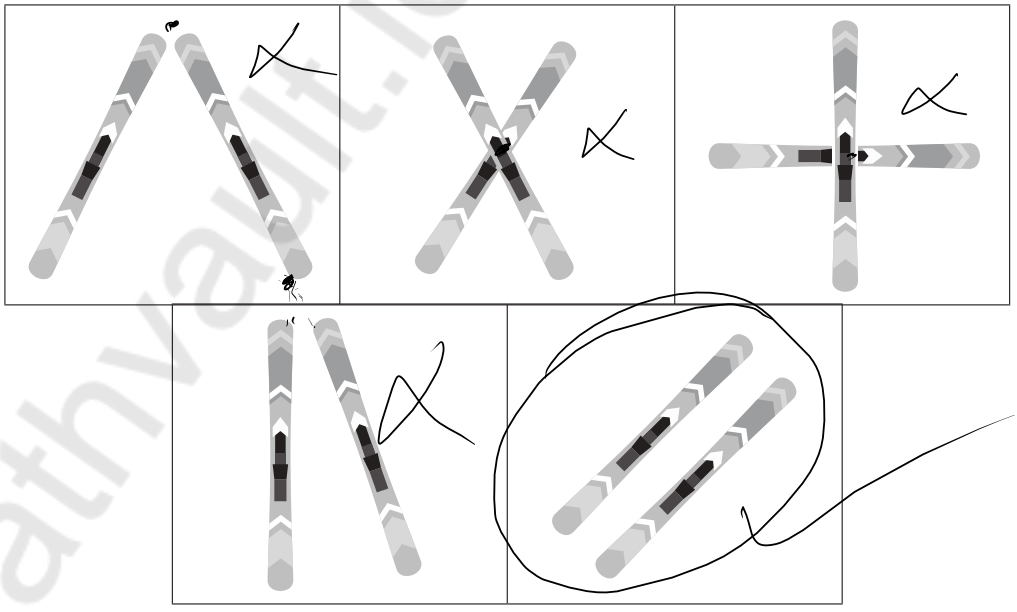
560mm 550 mm by 440 mm by 250 mm. 250mm 450mm

Will Tomos have to pay to take his rucksack on the flight?
You must clearly explain your answer. [2]

Yes ☐ No ☑

No, 550mm is less than 560mm } By conversion
440mm is less than 450mm }

(e) When skiing, Mrs Jones needs to practise turning, keeping her skis **parallel**.
Circle the picture below which shows Mrs Jones's skis parallel to each other. [1]



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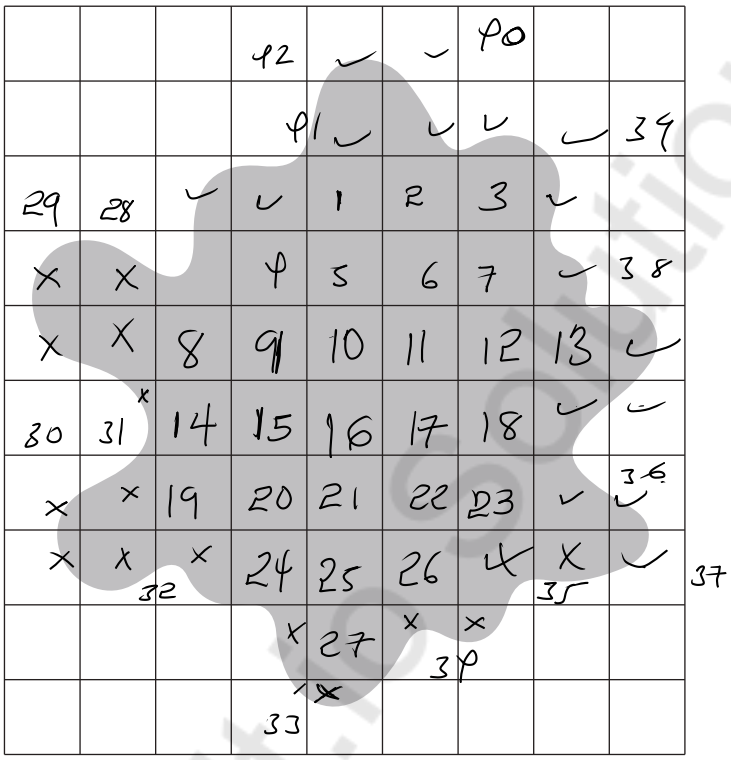
3. A large design is being painted on the floor of a playground.
The outline of the design is drawn to scale on a square grid.
The scale of the drawing is 1 cm represents 1 m.

Scale: 1 cm represents 1 m



The design will be painted with special paint.
Each tin of paint will cover 5 m^2 and costs £32.70.
How many tins of paint will be needed to paint the design?
How much will the paint cost?
You must show all your working. [6]

⇒ Area ⇒ 42 Square Unit ⇒ ✓

Number of tins of paint = Area ÷ $5m^2$

= 42 ÷ 5

= 8.4

≈ 8 ✓

Cost of Paint = 8 × £32.70 = 261.6

Number of tins of paint = 8

Cost of the paint = 261.6

Examiner only

4. Maldwyn sells flags, scarves and hats outside a stadium.
At the end of a football match, Maldwyn sells his remaining flags, scarves and hats at sale prices.

(a)

Scarf

Was £4.97
Now $\frac{3}{7}$ **off** in the sale

Flag

£8.50 each
Buy 2 and get **26% off** the total price

(i) Calculate the sale price of a scarf. [2]

$\Rightarrow \frac{3}{7} = 0.4286 \approx 0.43$

$\Rightarrow 0.43 \times £4.97 = £2.13$

$\Rightarrow £4.97 - £2.13 = £2.84$

(ii) Calculate the cost of buying **two** flags in the sale. [2]

$\Rightarrow$ Two flags $= 2 \times £8.50 = £17$

$\Rightarrow 26\%$ of £17 $= \frac{26}{100} \times 17 = \frac{442}{100} = £4.42$

$\Rightarrow £17 - £4.42$

$\Rightarrow £12.58$

(b) Before the sale, a hat cost £3.99.
In the sale, the hat costs £2.66.
By what fraction has the cost of the hat been **reduced**?
Circle your answer. [1]

$\frac{1}{4}$ $\quad$ $\frac{1}{3}$ $\quad$ $\frac{2}{3}$ $\quad$ $\frac{3}{4}$ $\quad$ $\frac{1}{2}$

$\Rightarrow £3.99 - £2.66 = 1.33 = \frac{133}{100} =$

$\Rightarrow \frac{\text{Reduced}}{\text{Original Sale}} = \frac{\frac{133}{100}}{3.99} = \frac{133}{100} \div 3.99 = \frac{133}{100} \div \frac{399}{100}$

$= \frac{133}{100} \times \frac{100}{399} = \frac{133}{399_3} = \frac{1}{3}$ ✓

Examiner only

5. Huw buys peanuts to feed the birds.

He finds the following prices for buying peanuts.

Bird Feast	Cheep Feed	Kind to Birds
£16.20 for 12·55 kg	£32 for 25 kg	£15.60 for 12 kg

Which of the above options is the best value for money?
You must show all your working. [5]

Bird feast = £16.20 for 12.55kg

= 16.20 ÷ 12.55

= 1.2908 ≈ 1.29

Cheap Feed ⇒ £32 for 25kg

⇒ 32 ÷ 25

= 1.28

Kind to Bird = £15.60 for 12kg

= $\frac{15.60}{12}$

= 1.3

Bird feast = 1.29 p/kg

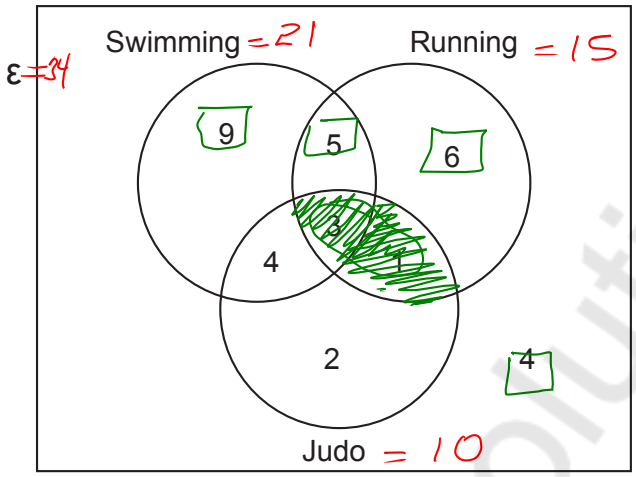
Cheap Feed = 1.28 p/kg

Kind to Bird = 1.3 p/kg

= Cheap Feed has the best value for money.

Examiner only

6. There are 34 pupils in class 10A.
Dewi carried out a survey to find out how many of these pupils take part in swimming, running and judo.
He displayed his results in a Venn diagram, as shown below.



(a) How many of the pupils in class 10A take part in both judo and running?
Circle your answer. [1]

1 8 4 3 21

= 3 + 1 = 4

(b) How many of the pupils in class 10A take part in swimming?
Circle your answer. [1]

9 4 14 3 21

= 9 + 5 + 4 + 3 = 21

(c) How many of the pupils in class 10A **do not** take part in judo?
Circle your answer. [1]

9 10 20 24 15

= 9 + 5 + 6 + 4 = 24

(d) Calculate the percentage of the pupils in class 10A who **do not** take part in swimming, running or judo.
Give your answer correct to 1 decimal place. [4]

= $\frac{\text{no of pupils who do not take part in S, R, J}}{\text{Total no of Pupils in Class 10A}} \times 100\%$

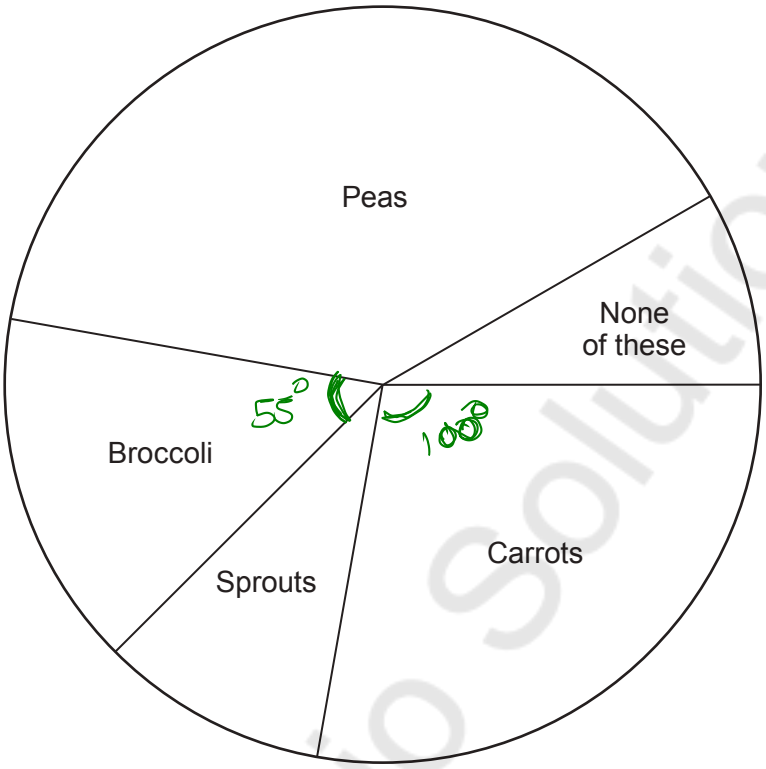
= $\frac{2}{17} \times 100\% = \frac{200\%}{17} = 11.76\%$

$\Omega = 11.8\%$

Turn over.

Examiner only

7. *(a)* 1080 people were asked to choose their favourite vegetable.
The pie chart shows the results.



(i) How many people chose broccoli as their favourite vegetable?
You must show all your working. [3]

⇒ Angle Sector of Broccoli ⇒ 55°

Such that

⇒ no of People who Chose broccoli as their favourite Vegetable $= \frac{\text{Angle of Sector}}{360^\circ} \times 1080$

$= \frac{55}{360} \times 1080$

$= \frac{55 \times 108}{36} = 165$ People

Examiner only

(ii) How many more people chose carrots than chose sprouts as their favourite vegetable?
You must show all your working. [3]

* Angle Sector of Carrots = 100°
* Angle Sector of Sprouts = 35°

⇒ For Carrots = $\frac{100^\circ}{360^\circ} \times 1080 = 300$ people

⇒ For Sprouts = $\frac{35}{360} \times 1080 = 105$ people

⇒ 300 − 105 = 195 People

(b) 420 people selected peas as their favourite vegetable.
They were asked which they preferred: fresh peas, frozen peas or tinned peas.

Of these 420 people, $\frac{3}{14}$ said they preferred fresh peas.

Twice as many people preferred frozen peas to tinned peas.

How many of these people preferred frozen peas? [4]

⇒ Fresh Peas = $\frac{3}{14}$ ⇒ Not fresh Peas = $1 - \frac{3}{14} = \frac{14-3}{14} = \frac{11}{14}$

⇒ $\frac{2}{3}$ ⇒ Fraction who Preffered frozen peas

⇒ $\frac{11}{14} \times \frac{2}{3} \Rightarrow \frac{22}{42} \times 420^{10}$

⇒ 22 × 10

= 220 People

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8. Last year, Simone's total income before tax was €30 000.

The tax bands, taxable income and tax rates last year were as follows:

Band	Taxable income	Tax rate
Personal Allowance	Up to €4000	0%
Basic rate	€4000 to €10 000	15%
Higher rate	over €10 000	22%

(a) Show that Simone should have paid €900 tax at the basic rate.
You must show all your working. [2]

⇒ Taxable Income = €4000 to €10,000

= €10000 − €4000

= €6000

⇒ 15% of €6000 ⇒ $\frac{15}{100} \times 6000 = 15 \times 60 = 900$

= €900

(b) Calculate Simone's **total** tax bill last year.
You must show all your working. [4]

⇒ Total income before tax = €30,000

⇒ Where the taxable Income = €10,000 +

Tax at 22% ⇒ 22% of (Total Income before tax) − (Taxable Income)

⇒ $\frac{22}{100} \times$ (€30,000 − €10,000)

⇒ $\frac{22}{100} \times$ €20,000

⇒ 22 × 200 ⇒ 4,400

⇒ €4,400 + €900

⇒ €5,300

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