Surname	Centre Number	Candidate Number
Other Names		0

wjec cbac

GCSE

3310U40-1

A18-3310U40-1

MATHEMATICS – NUMERACY
UNIT 2: CALCULATOR-ALLOWED
INTERMEDIATE TIER

THURSDAY, 8 NOVEMBER 2018 – MORNING

1 hour 45 minutes

E-20
D-30
C-40
B-52

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. Question numbers must be given for all work written on the continuation 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 **4***(d)*, 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.	5	5
2.	6	11
3.	3	14
4.	13	27
5.	7	34
6.	11	45
7.	11	56
8.	8	64
9.	6	70
10.	6	76
11.	4	80
Total	80	

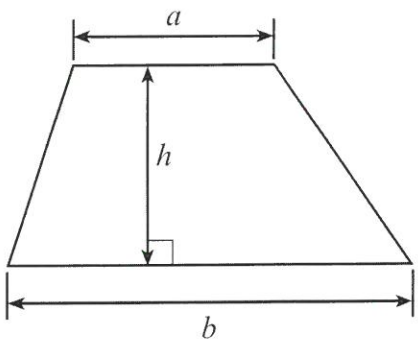
E
D
C
B

3310U401
01

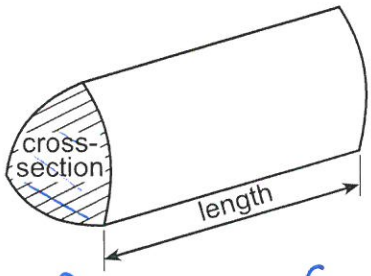
NOV183310U40101

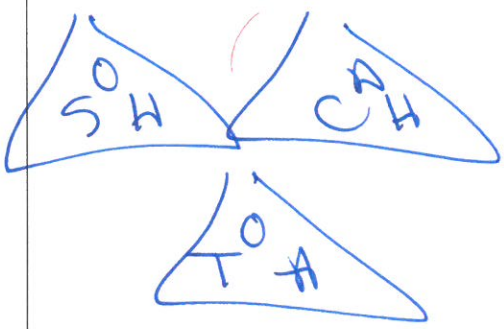
Formula List – Intermediate Tier

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



Volume of prism = area of cross-section × length





$A = \pi r^2$

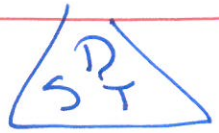
$C = 2\pi r$

$V = \pi r^2 h$

8km ≃ 5miles

1 litre ≃ 1.75pints

1 kg ≃ 2.2lb.



15 min ≃ $\frac{1}{4}$ hr = 0.25

30 min = $\frac{1}{2}$ hr = 0.5

45 min = $\frac{3}{4}$ hr = 0.75

Examiner only

1. *(a)*

T-shirt	Pair of shoes
	
Was £46	Was £43.60
Now **22% off** in the sale	Now $\frac{3}{8}$ **off** in the sale

(i) Calculate the sale price of the T-shirt. [2]

22% × 46 = £10.12

Sale Price = 46 − 10.12

= £35.88

78% × 46

= £35.88

M1

A1

3310U401 03

(ii) Calculate the sale price of the pair of shoes. [2]

$\frac{3}{8}$ × 43.60 = 16.35

Sale Price = 43.60 − 16.35

= £27.25

$\frac{5}{8}$ × 43.60 =

= £27.25

M1

A1

(b) Before the sale, a pair of jeans cost £43.
In the sale, the jeans cost £37.
By what fraction have the jeans been reduced in the sale?
Circle your answer. [1]

$\frac{37}{43}$ $\frac{43}{37}$ $\frac{6}{43}$ $\frac{6}{37}$ $\frac{37}{6}$

change / original

$\frac{6}{43}$

B1

Examiner only

2. Mixing 200 ml of white paint with 10 ml of red paint and 5 ml of blue paint makes light purple paint.

Paint is sold in tins of size 250 ml, 500 ml and 1 litre.

Jana is going to make some light purple paint.
She does not want to have any white, red or blue paint left over.
Jana wants to buy as **few tins of paint as possible**.

She buys a 250 ml tin of blue paint.

How many tins of paint will Jana need to buy altogether?
Complete the table below. [6]

W : R : B

200 : 10 : 5

×50 ×50 x? 50 M1

10 000 mL : 500 : 250 A1

1000 mL = 1 litre

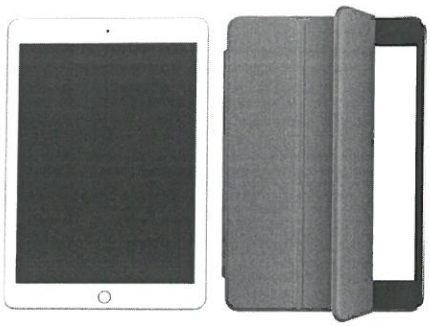
250 ÷ 5 = 50

10 x 1 litre 1 x 500 mL 1 x 250 mL.

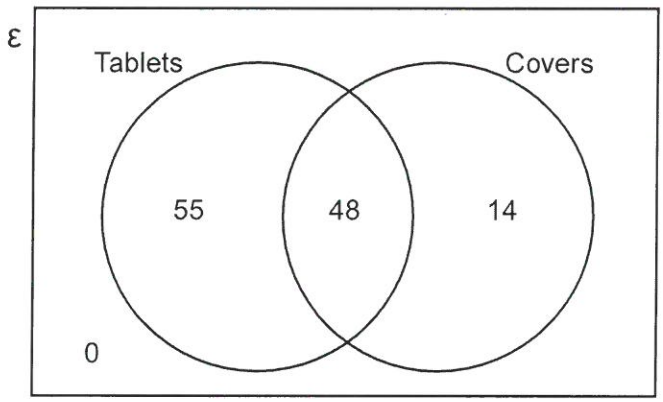
Colour of paint	Size of tin	Number of tins
Blue	250 ml	1
Red	500 mL	1 B1
White	1 litre	10 A2
		Total number of tins of paint = 12 B1

Examiner only

3. *Airand Electronics* only sells digital tablets and covers.



The Venn diagram shows the number of items sold by *Airand Electronics* during the first week in May.



Each tablet was sold for £220.
Each cover was sold for £18.

How much money in total did *Airand Electronics* take in the first week of May?

You must show all your working. [3]

TABLETS ONLY = 55 x 220 = £12100 M1

COVERS ONLY = 14 x 18 = £ 252 M1

TABLETS + COVER = 48 x 238 = £ 11424 +

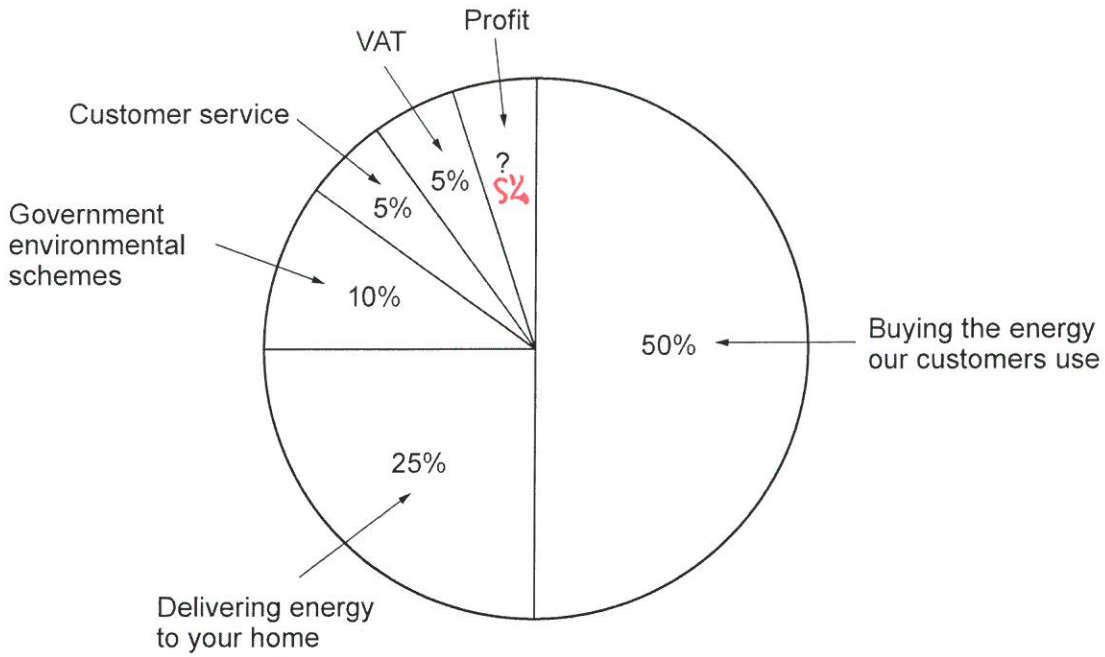
A1

£ 23776

3310U401
05

Examiner only

4. *(a)* *Rushmoore Energy* is a company that supplies electricity.
Last year, *Rushmoore Energy* displayed the following information in a pie chart.



The pie chart represents a total of £9100 million.

How much profit did *Rushmoore Energy* make last year?
Give your answer in millions of pounds. [3]

5% × £9100 million B1

M1

A1

Profit £ 455 million

(b) Last year, *Rushmoore Energy* had 8·58 million customers.
The previous year, *Rushmoore Energy* had 8·21 million customers.
How many extra customers were there last year?
Circle your answer. [1]

37 000 **370 000** 3 700 000 0·37 37 000 000

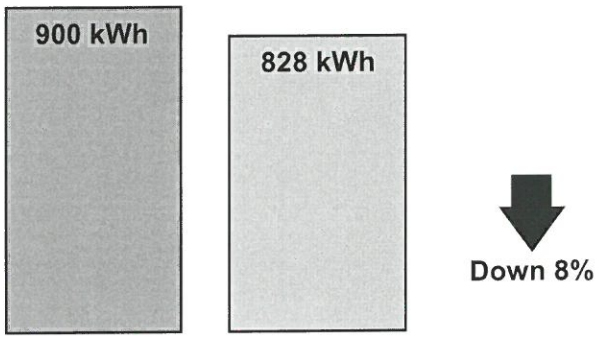
8·58 − 8·21 = 0·37 million B1

0·37 × 1 000 000

= 370 000

Examiner only

(c) Maggie looks at the back of her electricity bill.
It shows how much energy she used last period and this period.
This is the display she sees.



Is this decrease of 8% correct for the reduction in kWh?
You must show all your working to support your answer. [2]

Yes ☑ No ☐ Can't tell ☐

8% × 900 = 72
900 − 72 = 828

M1
A1

3310U401
07

Examiner only

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

Maggie used 828 kWh of electricity this period.
Electricity was charged at £0.18 per kWh.
The standing charge for this period was £65.
VAT at 5% is payable on the total cost of the electricity used and the standing charge.
Calculate Maggie's electricity bill.
You must show all your working. [5 + 2 OCW]

M1

Charge for electricity used = 828 × £0.18 = £149.04 A1

B1 Bill before VAT = 149.04 + 65 = £214.04

M1 VAT @ 5% = 5% × 214.04 = £10.70

A1 So Total Bill = £214.04 + £10.70
= £224.74

+OCW
+2

Examiner only

5. Zara is paid in dollars.
Last year, Zara's total income before tax was $25 000.

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

Band	Taxable income	Tax rate
Personal Allowance	Up to $10 000	0%
Basic rate	$10 000 to $22 000	20%
Higher rate	over $22 000	25%

(a) Show that Zara should have paid $2400 tax at the basic rate. [2]

Basic Rate $(22\,000 - 10\,000) \times 20\%$ B1
$= 12\,000 \times 20\%$ B1
$= \$2400$

(b) Zara's **total** tax bill last year was $4000.
She thinks an error has been made.
Calculate how much tax should be refunded to Zara.
You must show all your working. [5]

Higher Rate $= (25000 - 22000) \times 25\%$ M2
$= 3000 \times 25\%$
$= \$750$ A1

So tax bill should be $= 2400 + 750$
$= \$3150$ B1

So her refund $= 4000 - 3150$

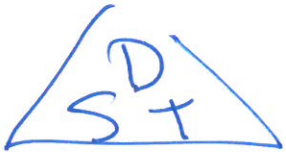
B1

Zara's tax refund is $ 850

3310U401 09

Examiner only

6. Emyr has set his lawn mower to work at a constant speed of 2000 m per hour.
He walks a distance of 300 m when he cuts his lawn.



(a) (i) Use this information to calculate how long Emyr takes to cut his lawn.
Give your answer in minutes. [2]

$T = \frac{D}{S} = \frac{300}{2000} = 0.15$

$= 0^{h} 9'$

M1

A1

It takes Emyr ..... 9 ..... minutes.

(ii) What assumption have you made? [1]

he does it change his speed at all or stop.

C1

(iii) What impact would this have on the time you calculated in answering *(a)*(i)? [1]

it would take him longer

C1

(b) Emyr cuts his lawn 25 times a year.
He uses 4·5 litres of petrol in his lawn mower each year.

How much petrol does the lawn mower use for every 100 metres that Emyr walks?
Give your answer in litres. [3]

Dist covered in 1 year = $25 \times 300 = 7500$ m B1

No of 100 m blocks = $7500 \div 100$

$= 75$

So petrol used per 100 m = $4.5 \div 75$ M1

$= 0.06$ litres A1

Examiner only

(c) Petrol costs £1.30 per litre.

Emyr says,
"The petrol for my lawn mower costs me approximately 60p per pint."

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

Yes ☐ No ☑

1 litre ≈ 1·75 pints ÷1.75 ÷1.75

$\frac{4}{7}$? ≈ 1 pint B1 M1

$\frac{4}{7} \times £1.30 = £0.74$ A1

(d) Emyr's friend claims that she walks $1\frac{7}{8}$ miles when she cuts her lawn.

Approximately how far is this in metres?
Circle your answer. [1]

780 metres 1200 metres 2400 metres **3000 metres** 3400 metres

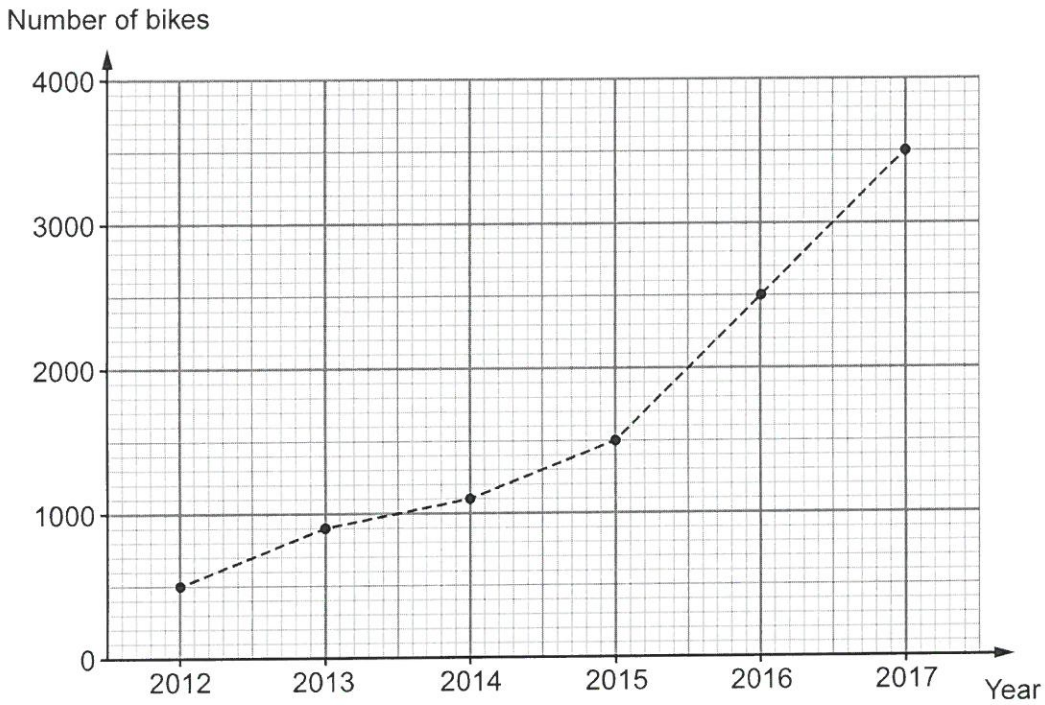
8 km ≈ 5 miles ÷5 ×5

$\frac{8}{5}$ km ≈ 1 mile B1

$1\frac{7}{8} \times \frac{8}{5} = 3$ km

Examiner only

7. *Tube Cycles* makes a large number of bikes each day.
The graph shows the number of bikes made on 1st July each year from 2012 to 2017.



(a) How many bikes were made on 1st July 2014? [1]
Circle your answer.

1010 1020 1050 1100 1200

B1

(b) From the graph, is it possible to say how many bikes were made on 1st December 2014? [1]
You must give a reason for your answer.

No, the graph only shows 1st July

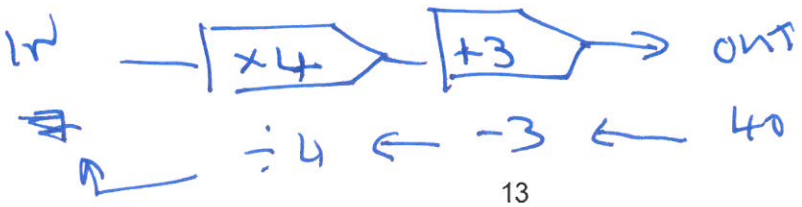
E1

(c) Complete the statement below. [1]

'On 1st July 2017, there were 7 times as many bikes made than on 1st July 2012.'

B1

2017: 3500 2012: 500



Examiner only

(d) On 1st December 2016, 4000 bikes were made at the *Tube Cycles* factory.
The *Tube Cycles* factory was working at 80% capacity on that day.
This means that only 80% of the maximum possible number of bikes were made.

When the factory works at 95% capacity, how many bikes are made in one day? [3]

80% of max = 4000

max → ×80% → 4000

÷80%

Max capacity = 4000 ÷ 80% = 5000

So 95% × 5000 = 4750

(e) (i) In October 2018, the manager of the *Tube Cycles* factory recorded the number of bikes made each day.
Here are her results.

Number of bikes, b	Frequency	
$1000 \leqslant b < 2000$	1500 × 3 =	4500
$2000 \leqslant b < 3000$	2500 × 12 =	30000
$3000 \leqslant b < 4000$	3500 × 9 =	31500
$4000 \leqslant b < 5000$	4500 × 7 =	31500

Calculate an estimate of the mean number of bikes made per day during October 2018. [4]

Mean = $\frac{\text{total}}{\text{count}} = \frac{97500}{31}$

= 3145

(ii) Which group contains the **median** number of bikes made per day?
Circle your answer. [1]

$1000 \leqslant b < 2000$ $2000 \leqslant b < 3000$ $3000 \leqslant b < 4000$

$4000 \leqslant b < 5000$ Can't tell

15 → 16 ← 15

Examiner only

8. Amrit and Gareth are planning to go to Switzerland.
The table below shows the rates for exchanging British pounds (£) and Swiss francs (CHF) at a money exchange shop.

Buy Swiss francs (CHF)	£1 buys 1.24 CHF
Sell Swiss francs (CHF)	1.28 CHF buys £1

The exchange shop:
- has all possible British notes and coins,
- sells and buys CHF **notes only** (no coins are available or accepted),
- has 10 CHF, 20 CHF, 50 CHF, 100 CHF, 200 CHF and 1000 CHF notes.

(a) Amrit has £480 to buy Swiss francs.
Calculate
- the maximum number of Swiss francs that Amrit can buy, and
- how much, to the nearest penny, this will cost him.

You must show all your working. [5]

£480 × 1·24 = 595·2 CHf M1
✗ ✗ A1
most he can buy = 590 CHf A1
£ → ×1·24 CHf → CHf
£475·81 ? ← ÷1·24 ← 590 M1 A1

Examiner only

(b) Gareth paid £250 to buy 310 CHF.
Unfortunately, he is now unable to go to Switzerland.
How much will Gareth lose in selling 310 CHF back to buy pounds? [3]

310 ÷ 1·28 = £242·19 M1 A1

So he loses 250 − 242·19
= £7·81 A1

Examiner only

9. *(a)* Luned's tent is in the shape of a triangular prism.
The cross-section of her tent is an isosceles triangle.

She noted a few measurements on a diagram of her tent, as shown below.

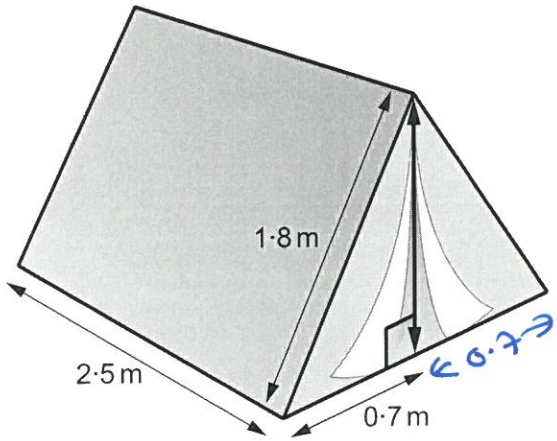


Diagram not drawn to scale

Calculate the volume of Luned's tent.
Give your answer in m^3.
You must show all your working. [5]

$1.8^2 = 3.24$

$0.7^2 = 0.49$

2.75

$\sqrt{2.75} = 1.7\text{m}$

Area of $\triangle = \frac{1}{2} \times 1.4 \times 1.7 = 1.19\ m^2$

Volume = $1.19 \times 2.5 = 2.975$

Volume of Luned's tent is 3 m^3

M1
A1
A1
M1
A1

(b) Which of the following is equal to $0.2\ m^3$?
Circle your answer. [1]

20 cm^3 | 200 cm^3 | 2000 cm^3 | **200 000 cm^3** | 2 000 000 cm^3

B1

1m = 100 cm
1m = 100 cm
1m = 100 cm

$0.2 \times 100 \times 100 \times 100$

=

Examiner only

10. Cycle frames are made from steel, aluminium or carbon fibre.
The table below gives the density of steel, aluminium and carbon fibre.

Material	Density (g/cm^3)
Steel	7·8
Aluminium	2·7
Carbon fibre	1·6

Owain has a cycle frame made from aluminium.
His cycle frame has a mass of 9450 g.

(a) Calculate the volume of aluminium in Owain's cycle frame.
Give your answer in cm^3. [3]

$V = \frac{m}{D} = \frac{9450}{2.7}$ M2

Volume of aluminium in Owain's cycle frame is 3500 cm^3 A1

(b) Bethan has a cycle frame that is identical to Owain's cycle frame.
However, her cycle frame is made from carbon fibre.
Calculate the mass of this frame.
Give your answer in grams. [3]

$m = D \times V$
$= 1.6 \times 3500$ M2
$= 5600$
A1

Mass of this cycle frame is 5600 g

Examiner only

11. The diagram below is a sketch of the Eiffel Tower.
The sketch **is** drawn to scale.
The Eiffel Tower is 324 metres tall.
Visitors can climb up to the Level 2 viewing platform using the internal steps.

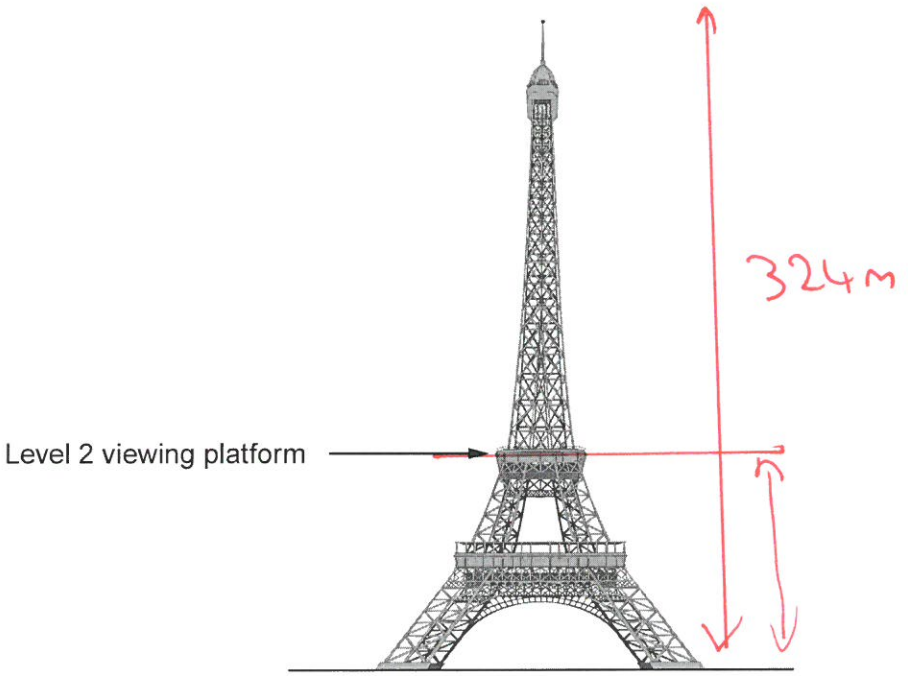


Diagram is drawn to scale

(a) Which of the following is a reasonable estimate of the number of steps from the ground to the Level 2 viewing platform? [1]

150 650 2500 3500 6500

$\frac{1}{3} \times 324 = 108$ m

B1

1 step $\simeq$ 20 cm = 0·2 m

N° of steps = 108 ÷ 0·2
= 540

Examiner only

(b)

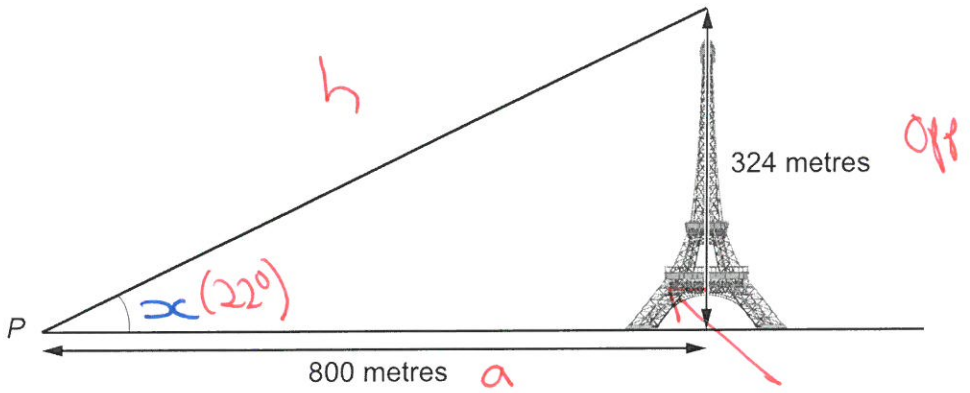
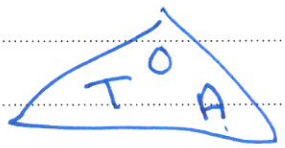


Diagram not drawn to scale

Calculate the angle of elevation of the top of the Eiffel Tower from the point *P*. [3]



$\tan x = \frac{O}{A}$

$\tan x = \frac{324}{800}$

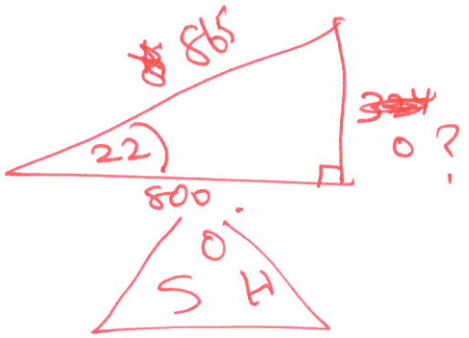
END OF PAPER

$x = \tan^{-1}\left(\frac{324}{800}\right)$

$= 22°$

M2

A1



$h = \frac{OH}{\sin 22}$

$h = \frac{324}{\sin 22}$