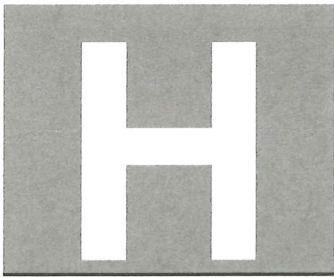


FOR OFFICIAL USE



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National
Qualifications
2023 MODIFIED

Mark

--

X844/76/01

Applications of Mathematics

WEDNESDAY, 3 MAY

9:00 AM – 11:05 AM



Fill in these boxes and read what is printed below.

Full name of centre

WORKED SOLUTIONS.

Town

--

Forename(s)

--

Surname

H Wallace

Number of seat

--

Date of birth

Day

Month

Year

--	--

--	--

--	--

Scottish candidate number

--	--	--	--	--	--	--	--	--	--

Total marks — 65

Attempt ALL questions.

You may use a calculator.

To earn full marks you must show your working in your answers.

State the units for your answer where appropriate.

You should refer to the pre-release material for Higher Applications of Mathematics which you can access electronically.

Write your answers clearly in the spaces provided in this booklet. Additional space for answers is provided at the end of this booklet. If you use this space you must clearly identify the question number you are attempting.

Questions 5, 8 and 11 must be completed on software and then be printed.

Use blue or black ink.

Before leaving the examination room you must place this booklet and your printouts inside the clear envelope provided. You must give this envelope to the Invigilator; if you do not, you may lose all the marks for this paper.



Information and instructions for candidates

The electronic files listed below are provided for you to use during this examination:

- 'Q5 Coffee.csv' — a spreadsheet file containing a data set
- 'Q5 Coffee Answers.docx' — a word processing file. Your output from the statistical software in questions 5 (a), (b) (i), and (c) (i) must be copied and pasted into this file for printing.
- 'Q8 Warehouse.xlsx' — a spreadsheet file containing 1 worksheet
- 'Q11 Ramsay's Loan.xlsx' — a spreadsheet containing 2 worksheets

You must display your name, SCN and centre name on all pages on each printout. Spaces have been provided in each electronic file for you to complete this information.

When printing spreadsheet files, ensure that:

- landscape orientation is used
- grid lines are shown
- row and column headings are shown
- the option 'Fit All Columns on One Page' is selected.

When printing word processing files ensure that portrait orientation is used.

Use this table to make sure you have all the printouts required.

Question	Printout	Completed (✓)
5 (all parts)	'Q5 Coffee Answers.docx' This should include your statistical software output, and answers.	✓
8 (a) and (b) (i)	'Warehouse Stock' worksheet <ul style="list-style-type: none">• value view• formula view	✓ ✓
11 (a)	'Bank Loan' worksheet <ul style="list-style-type: none">• value view• formula view	✓ ✓
11 (b)	'Loan Company' worksheet <ul style="list-style-type: none">• value view• formula view	✓ ✓



* X 8 4 4 7 6 0 1 0 2 *

Total marks — 65
Attempt ALL questions

1. A school year in Scotland usually lasts 190 days.

Estimate the total number of hours that a typical pupil in Scotland will spend in school during their lifetime.

State any further assumptions you make.

3

Assumptions : Start school age 5 }
 Leave school age 17 } 12 years.

School day begins 9am }
 Finishes by 3.30pm } 6.5 hours

Calculations : $6.5 \text{ hrs} \times 190 \text{ days} \times 12 \text{ years}$
 $\approx \underline{\underline{14,820 \text{ hours. in school.}}}$

[Turn over



2. In a cooking competition, a contestant has 80 minutes to make a crème brûlée. There are several tasks that need to be completed to make the crème brûlée. The contestant's timings for each task are shown.

Task	Description	Preceding task	Time (minutes)
X (A)	heat oven	none	(8)
B	gather ingredients and prepare bowls	none	10
C	whisk egg yolks and sugar	B	5
D	heat double cream in pan	B	4
E	add cream to egg yolk mixture	C, D	2
F	sieve mixture and put into bowls	E	4
(G)	put bowls into oven and cook	A, F	35
H	tidy workspace	F	12
I	sprinkle caster sugar over each bowl and caramelize	G	3
J	plate up and serve	I	5

Delay + 8



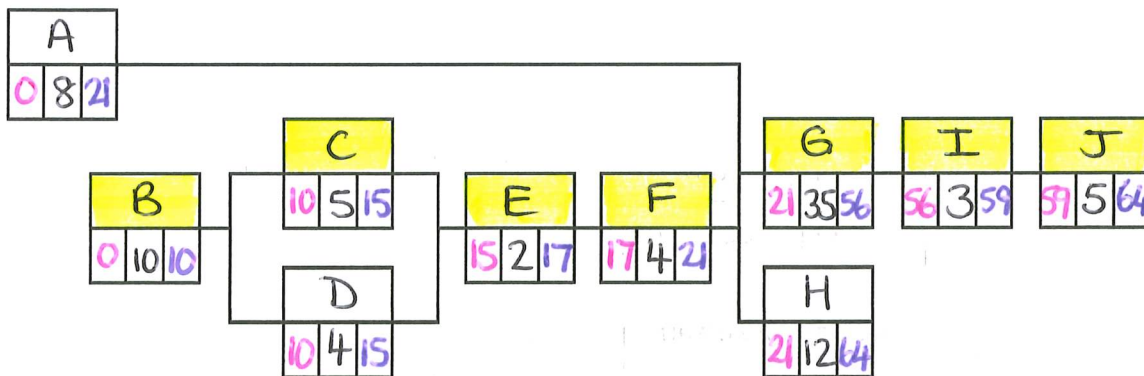
* X 8 4 4 7 6 0 1 0 4 *

2. (continued)

- (a) Complete the PERT chart below to allow the contestant to determine the earliest start time and latest completion time for each task.

6

(An additional diagram, if required, can be found on page 16.)



When the contestant puts the bowls into the oven, they realise the oven has not been heated.

Task G.

- (b) Determine whether they can still finish on time.

Give a reason for your answer.

2

The contestant will require 64 minutes, but with an 8 minute delay, they will now require 72 minutes, which means they will still finish on time! (72 < 80 mins).

[Turn over



3. An online survey is sent out by email to people on the electoral register who live in Renfrewshire.

The aim of the survey is to determine which political party people intend to vote for in an upcoming election.

The survey asks participants to answer the following questions:

- State your age in years.
- State your gender.
Please select from: male, female, non-binary, other, prefer not to say.
- Which political party do you intend to vote for in the upcoming election?
- Did you vote in the last election?
Please select from: yes, no, don't know, prefer not to say.
- If yes, state which political party you did vote for in the last election.

(a) State the type of data that best describes

(i) age

1

Discrete numerical data

(ii) gender.

1

Categorical data

The results of the online survey are to be used to predict the outcome of an upcoming national election.

(b) Give two reasons why these results do not provide a representative sample of the national population to allow the prediction to be accurate.

2

As this was an online survey, not all voters will be able to access the internet.

This survey was sent locally, and does not represent the national population.



4. You must refer to the information on 'Scottish Tax Bands 2022/23' given in the pre-release material when answering this question.

James works for a large building company. He is a permanent employee and earns a gross annual salary of £36,700.

James pays 4.7% of his gross annual salary into his pension and pays £3071.45 National Insurance per annum.

Calculate his net annual salary after all deductions.

4

Pension contribution = 4.7% of £36700 = £1724.90.

Taxable income = 36700 - 1724.90 = £34,975.10

Band	Rate	Value	Tax
P. Allowance	0%	12570	0
Starter	19%	2162	410.78
Basic	20%	10956	2191.20
Intermediate	21%	9287.10	1950.29
		£34975.10	£4552.27

Total Deducts = 1724.90 + 4552.27 + 3071.45
= £9348.62

Net Annual Salary = 36700 - 9348.62
= £27,351.38

[Turn over



5. You must refer to the spreadsheet file 'Q5 Coffee.csv' for the data, and the word file 'Q5 Coffee Answers.docx' when answering this question.
- You must complete parts (a), (b) (i), and (c) (i) using appropriate statistical software.
- You must include all output from statistical software, and your answers in the word processing file 'Q5 Coffee answers.docx'.

A specialist coffee shop sells 22 different drinks.

For each drink the following data are provided:

- carbohydrate content (grams)
- number of calories (kCals).

The number of calories is dependent on the carbohydrate content of the drink.

- | | | |
|-----|---|---|
| (a) | Construct a scatter plot of number of calories on carbohydrate content. | 2 |
| (b) | (i) Find the correlation coefficient between number of calories and carbohydrate content. | 2 |
| | (ii) Interpret the correlation coefficient. | 1 |
| (c) | (i) Find the equation of the regression line of number of calories on carbohydrate content. | 2 |
| | (ii) Interpret the slope and intercept parameters. | 2 |
| (d) | Estimate the number of calories in a drink which has 59 g of carbohydrate. | 1 |

Print the word processing file 'Q5 Coffee Answers.docx'.

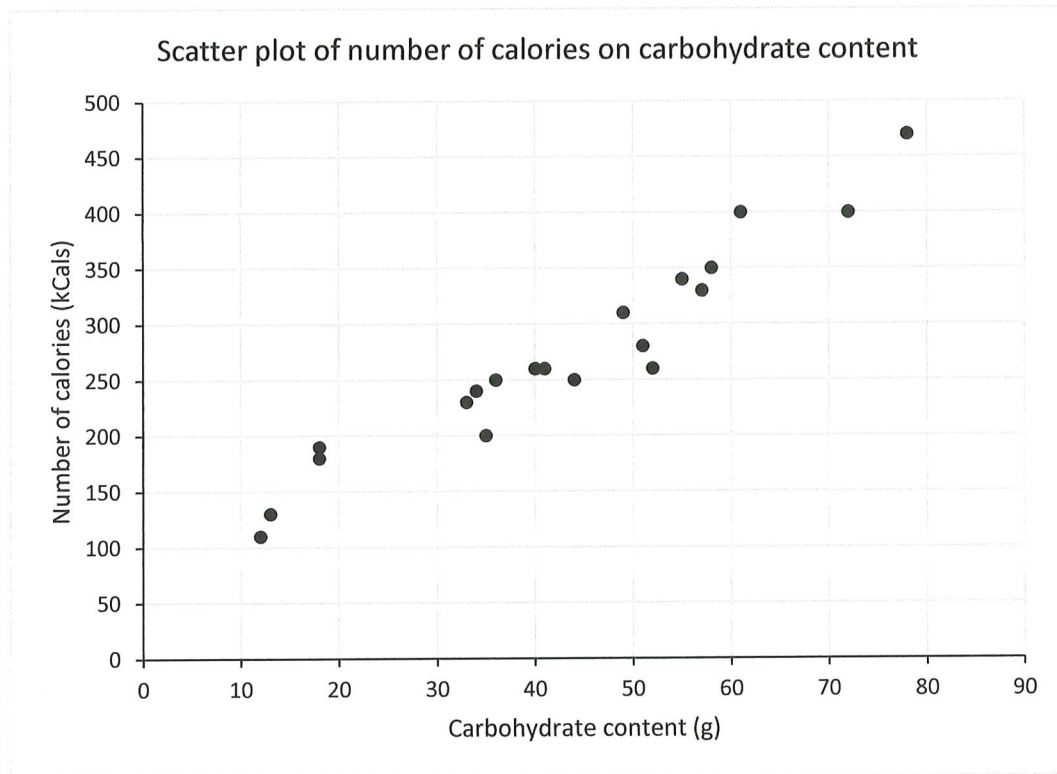


Name: H WALLACE

SCN:

Centre name: WORKED SOLUTIONS (USING EXCEL)

(a)

Statistical software output:

(b) (i)

Statistical software output:`=PEARSON(B1:B23,C1:C23)`*Answer:*

Correlation coefficient = 0.962826155

(ii)

Answer:

As the correlation coefficient is very close to 1, then there is a strong positive linear relationship between carbohydrate content and number of calories.

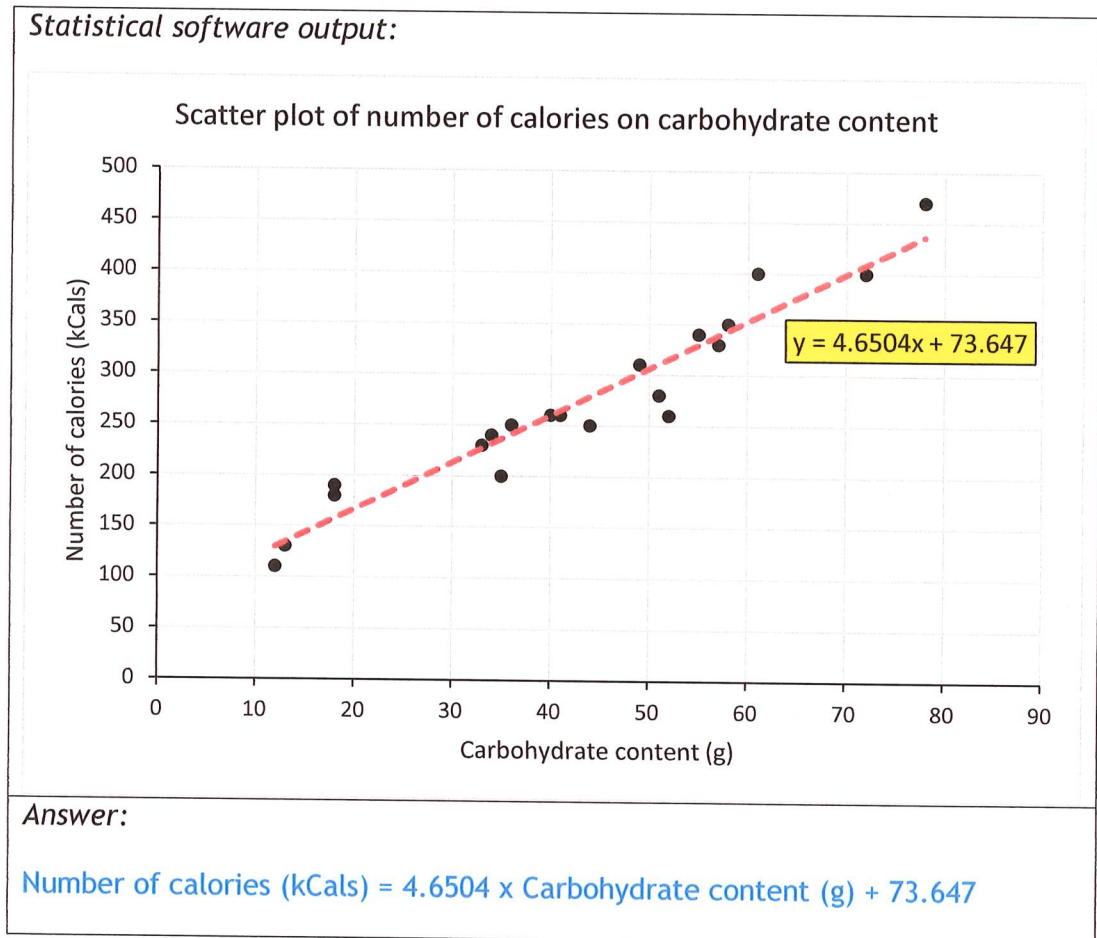
As the carbohydrate content increases, so too does the number of calories.

Name: H WALLACE

SCN:

Centre name: WORKED SOLUTIONS (USING EXCEL)

(c) (i)



(ii)

Answer:

The number of calories increases by 4.6504 kCals for every additional gram of carbohydrate.

The number of calories in a coffee with zero carbohydrate content will be 73.647 kCals.

(d)

Answer:

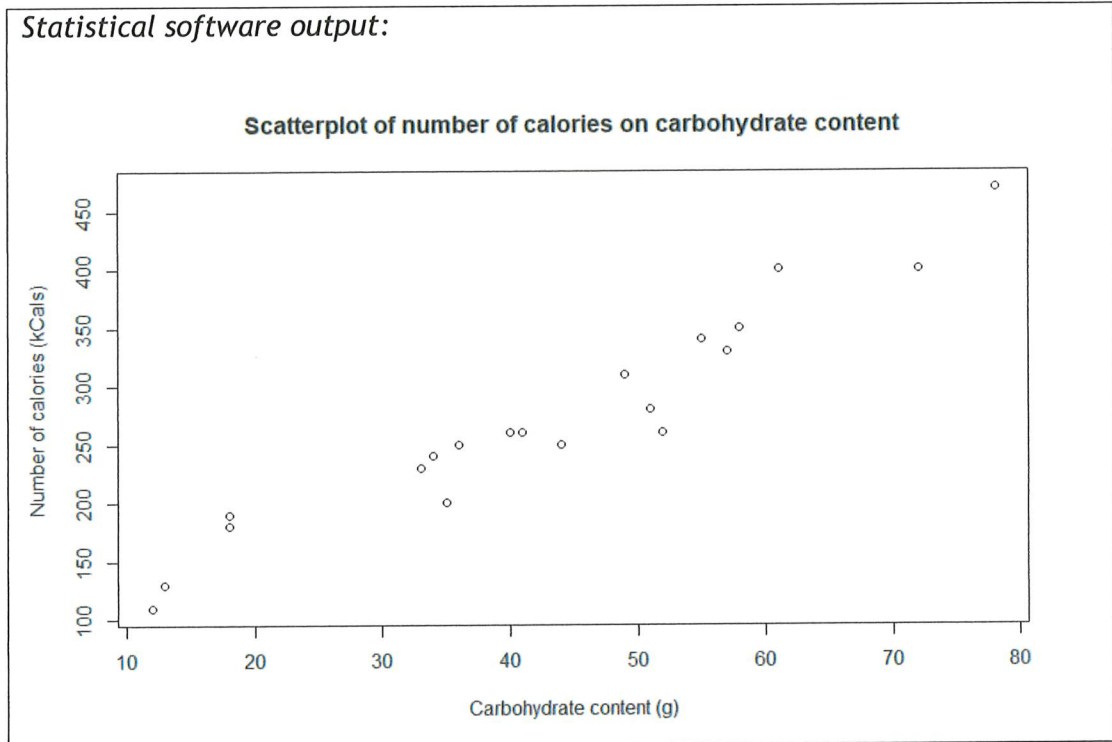
Number of calories (kCals) = $4.6504 \times 59 + 73.647 = 348.0206 \approx 348$ kCals.

Name: H WALLACE

SCN:

Centre name: WORKED SOLUTIONS (USING RSTUDIO)

(a)

Statistical software output:

(b) (i)

Statistical software output:

```
> cor.test(Carbohydrate.Content, Number.of.Calories)
```

```
    Pearson's product-moment correlation
```

```
data: Carbohydrate.Content and Number.of.Calories
```

```
t = 15.941, df = 20, p-value = 7.8e-13
```

```
alternative hypothesis: true correlation is not equal to 0
```

```
95 percent confidence interval:
```

```
 0.9110422 0.9847070
```

```
sample estimates:
```

```
cor
```

```
0.9628262
```

Answer:**Correlation coefficient = 0.9628262**

Name: H WALLACE	SCN:												
Centre name: WORKED SOLUTIONS (USING RSTUDIO)													

(b) (ii)

Answer:

As the correlation coefficient is very close to 1, then there is a strong positive linear relationship between carbohydrate content and number of calories.

As the carbohydrate content increases, so too does the number of calories.

(c) (i)

Statistical software output:

```
> lm(Number.of.Calories~Carbohydrate.Content)
Call:
lm(formula = Number.of.Calories ~ Carbohydrate.Content)

Coefficients:
      (Intercept)  Carbohydrate.Content
           73.65              4.65
```

Answer:

Number of calories (kCals) = 4.65 x Carbohydrate content (g) + 73.65

(ii)

Answer:

The number of calories increases by 4.65 kCals for every additional gram of carbohydrate.

The number of calories in a coffee with zero carbohydrate content will be 73.65 kCals.

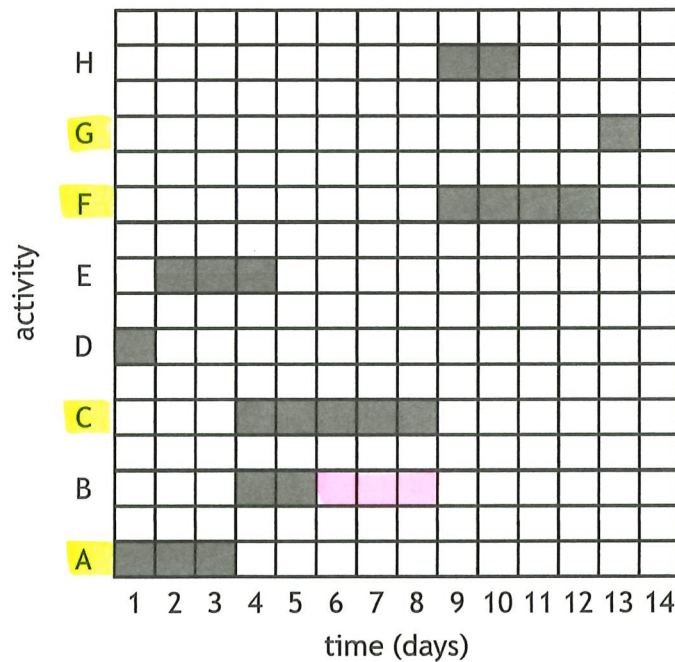
(d)

Answer:

```
> predict(lm(Number.of.Calories ~ Carbohydrate.Content), newdata=data.frame(Carbohydrate.Content=59),
interval = "pred")
      fit      lwr      upr
1 348.0205 294.3811 401.6598
```

Number of calories ≈ 348 kCals.

6. The Gantt chart below shows the activities required to complete a project.



Activity G is dependent on activities F and H.

Activity F is dependent on activities B, C and E.

Activity E is dependent on activity D.

Activities C and B are dependent on activity A.

(a) State the critical path for this project.

1

A - C - F - G.

(b) State the duration of the float time for activity B.

1

3 days.

(c) State one advantage of using a Gantt chart.

1

A Gantt chart is clear and simple to read, and easy to see float times.



* X 8 4 4 7 6 0 1 0 9 *

7. Taylor opens a savings account on 1 April 2021 with an initial deposit of £400. The effective rates of interest for the savings account are as follows.

Dates	Interest rate
1 April 2021 to 31 January 2022	1.2% per year
1 February 2022 to 31 July 2022	0.11% per month
From 1 August 2022	1.7% per year

Taylor makes further deposits of £200 on 1 August 2021 and £250 on 1 April 2022.

- (a) Calculate the balance in Taylor's savings account on 31 July 2022.

4

Timeline diagram showing deposits and interest periods:

- £400 deposit on 01 Apr 2021, interest period 4 months (yellow)
- £200 deposit on 01 Aug 2021, interest period 6 months (yellow)
- £250 deposit on 01 Apr 2022, interest period 2 months (pink)
- Interest period 4 months (pink) from 01 Apr 2022 to 31 Jul 2022

$$\begin{aligned} \text{1st deposit} &= £400 \times 1.012^{\frac{10}{12}} \times 1.0011^6 = £406.67 \\ \text{2nd deposit} &= £200 \times 1.012^{\frac{6}{12}} \times 1.0011^6 = £202.53 \\ \text{3rd deposit} &= £250 \times 1.0011^4 = £251.10 \\ \hline \text{Balance on 31 July 2022} &= \underline{\underline{£860.30}} \end{aligned}$$

Taylor made a final deposit into this account on 1 August 2022. On 1 December 2022, their savings account balance was £1000.

- (b) Calculate how much they deposited on 1 August 2022.

2

$$(\underline{\underline{£860.30}} + ?) \times 1.017^{\frac{4}{12}} = £1000$$

Working backwards.

$$£1000 \div 1.017^{\frac{4}{12}} = £994.40$$

$$\text{Final deposit} = 994.40 - 860.30 = \underline{\underline{£134.10}}$$


8. You must refer to the spreadsheet file 'Q8 Warehouse.xlsx' when answering this question.
 You must complete parts (a) and (b) (i) using the spreadsheet file.
 Parts (b) (ii), (c) and (d) must be completed in the answer space provided.

A warehouse company currently has 1750 units of stock. They deliver 20% of their current stock each week, and receive 300 units of new stock per week.

- (a) Complete the 'Warehouse Stock' worksheet to identify (in cell C10) the predicted number of units of stock in the warehouse at the end of week 26. 3
- (b) (i) Extend the table in your worksheet to construct a graph to show the units of stock for 52 weeks. 2
- (ii) Using the graph constructed in (b) (i), state which type of mathematical model best describes the units of stock in the warehouse. 1

The model shows exponential decay.

After 52 weeks, the warehouse company plans to move to a smaller building with space for 1400 units of stock.

- (c) Comment on whether the smaller building will have enough space for the stock.
 Justify your answer. 1

No, the smaller building will not have enough space as the units of stock are expected to level out at $1500 > 1400$.

- (d) State one reason why this mathematical model may not be realistic. 1

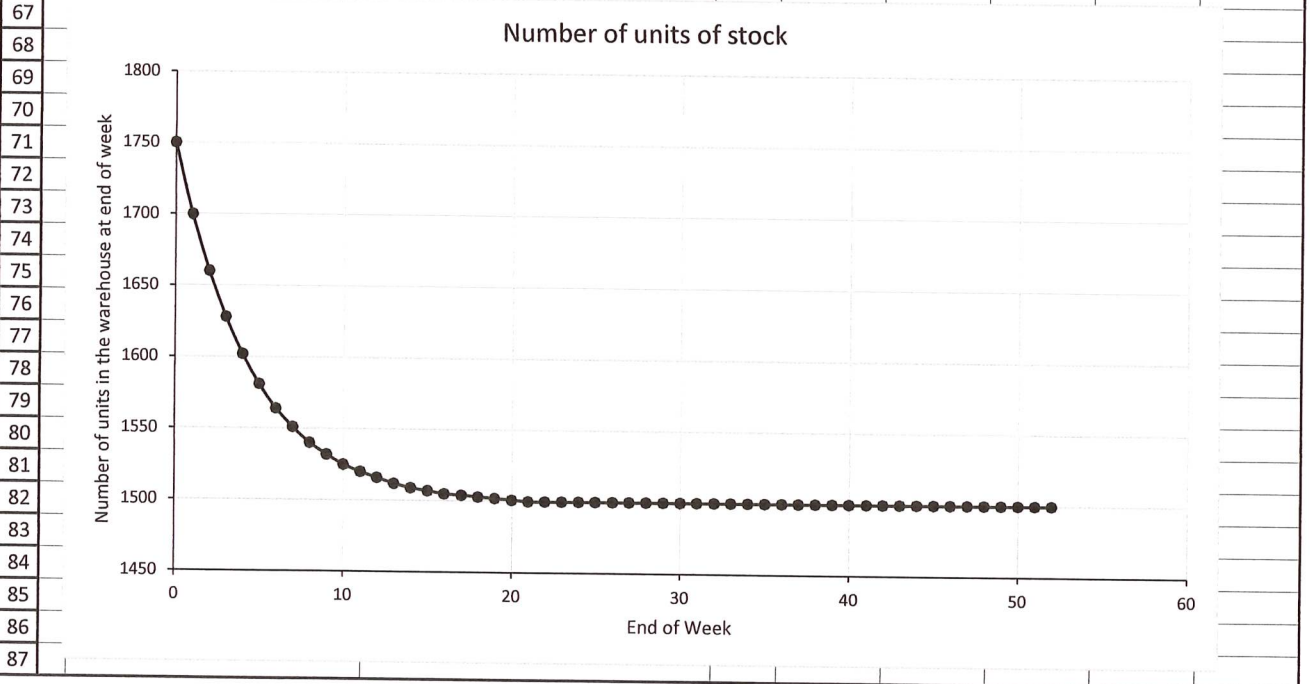
This model assumes that they continue to deliver and receive a fixed rate each week, whereas it will likely vary.

Print the 'Warehouse Stock' worksheet in value view and formula view. Ensure the graph is positioned beside the table and is contained on one page in the printout.



A	B	C	D	E	F	G	H	I	
1	Name:	H WALLACE							
2	SCN:								
3	Centre name:	WORKED SOLUTIONS							
4									
5	Warehouse Stock Prediction								
6									
7	Initial number of units of stock (week 0)	1750						VALUE VIEW	
8	Percentage of stock remaining at end of week	80%							
9	Number of units of new stock per week	300							
10	Number of units of stock at the end of week 26	1500							
11									
12	End of week	Number of units of stock							
13	0	1750							
14	1	1700							
15	2	1660							
16	3	1628							
17	4	1602							
18	5	1581							
19	6	1564							
20	7	1551							
21	8	1540							
22	9	1532							
23	10	1525							
24	11	1520							
25	12	1516							
26	13	1512							
27	14	1509							
28	15	1507							
29	16	1505							
30	17	1504							
31	18	1503							
32	19	1502							
33	20	1501							
34	21	1500							
35	22	1500							
36	23	1500							
37	24	1500							
38	25	1500							
39	26	1500							
40	27	1500							
41	28	1500							
42	29	1500							
43	30	1500							
44	31	1500							
45	32	1500							
46	33	1500							
47	34	1500							
48	35	1500							
49	36	1500							
50	37	1500							
51	38	1500							
52	39	1500							
53	40	1500							
54	41	1500							
55	42	1500							

	A	B	C	D	E	F	G	H	I
1		Name: H WALLACE							
2		SCN:							
3		Centre name: WORKED SOLUTIONS							
4									
5		Warehouse Stock Prediction							
56		43	1500						
57		44	1500						
58		45	1500						
59		46	1500						
60		47	1500						
61		48	1500						
62		49	1500						
63		50	1500						
64		51	1500						
65		52	1500						
66									

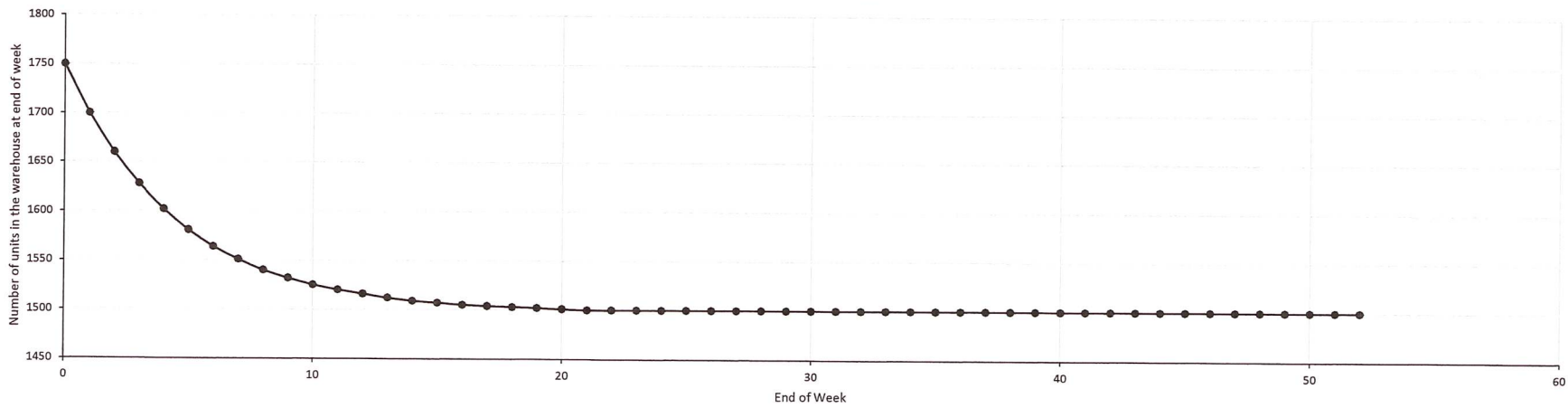


A	B	C	D	E	F	G	H	I
1	Name:	H WALLACE						
2	SCN:							
3	Centre name:	WORKED SOLUTIONS						
4								
5	Warehouse Stock Prediction							
6								
7	Initial number of units of stock (week 0)	1750						
8	Percentage of stock remaining at end of week	0.8						
9	Number of units of new stock per week	300						
10	Number of units of stock at the end of week 26	=C39						
11								
12	End of week	Number of units of stock						
13	0	=C7						
14	1	=INT(\$C\$8*C13+\$C\$9)						
15	2	=INT(\$C\$8*C14+\$C\$9)						
16	3	=INT(\$C\$8*C15+\$C\$9)						
17	4	=INT(\$C\$8*C16+\$C\$9)						
18	5	=INT(\$C\$8*C17+\$C\$9)						
19	6	=INT(\$C\$8*C18+\$C\$9)						
20	7	=INT(\$C\$8*C19+\$C\$9)						
21	8	=INT(\$C\$8*C20+\$C\$9)						
22	9	=INT(\$C\$8*C21+\$C\$9)						
23	10	=INT(\$C\$8*C22+\$C\$9)						
24	11	=INT(\$C\$8*C23+\$C\$9)						
25	12	=INT(\$C\$8*C24+\$C\$9)						
26	13	=INT(\$C\$8*C25+\$C\$9)						
27	14	=INT(\$C\$8*C26+\$C\$9)						
28	15	=INT(\$C\$8*C27+\$C\$9)						
29	16	=INT(\$C\$8*C28+\$C\$9)						
30	17	=INT(\$C\$8*C29+\$C\$9)						
31	18	=INT(\$C\$8*C30+\$C\$9)						
32	19	=INT(\$C\$8*C31+\$C\$9)						
33	20	=INT(\$C\$8*C32+\$C\$9)						
34	21	=INT(\$C\$8*C33+\$C\$9)						
35	22	=INT(\$C\$8*C34+\$C\$9)						
36	23	=INT(\$C\$8*C35+\$C\$9)						
37	24	=INT(\$C\$8*C36+\$C\$9)						
38	25	=INT(\$C\$8*C37+\$C\$9)						
39	26	=INT(\$C\$8*C38+\$C\$9)						
40	27	=INT(\$C\$8*C39+\$C\$9)						
41	28	=INT(\$C\$8*C40+\$C\$9)						
42	29	=INT(\$C\$8*C41+\$C\$9)						
43	30	=INT(\$C\$8*C42+\$C\$9)						
44	31	=INT(\$C\$8*C43+\$C\$9)						
45	32	=INT(\$C\$8*C44+\$C\$9)						
46	33	=INT(\$C\$8*C45+\$C\$9)						
47	34	=INT(\$C\$8*C46+\$C\$9)						

FORMULAE VIEW

A	B	C	D	E	F	G	H	I
1		Name: H WALLACE						
2		SCN:						
3		Centre name: WORKED SOLUTIONS						
4								
5	Warehouse Stock Prediction							
48	35	=INT(\$C\$8*C47+\$C\$9)						
49	36	=INT(\$C\$8*C48+\$C\$9)						
50	37	=INT(\$C\$8*C49+\$C\$9)						
51	38	=INT(\$C\$8*C50+\$C\$9)						
52	39	=INT(\$C\$8*C51+\$C\$9)						
53	40	=INT(\$C\$8*C52+\$C\$9)						
54	41	=INT(\$C\$8*C53+\$C\$9)						
55	42	=INT(\$C\$8*C54+\$C\$9)						
56	43	=INT(\$C\$8*C55+\$C\$9)						
57	44	=INT(\$C\$8*C56+\$C\$9)						
58	45	=INT(\$C\$8*C57+\$C\$9)						
59	46	=INT(\$C\$8*C58+\$C\$9)						
60	47	=INT(\$C\$8*C59+\$C\$9)						
61	48	=INT(\$C\$8*C60+\$C\$9)						
62	49	=INT(\$C\$8*C61+\$C\$9)						
63	50	=INT(\$C\$8*C62+\$C\$9)						
64	51	=INT(\$C\$8*C63+\$C\$9)						
65	52	=INT(\$C\$8*C64+\$C\$9)						
66								

Number of units of stock



9. The Consumer Price Index (CPI) in the UK in April 2021 was 110.4, relative to a baseline of 100 in April 2015.

(a) Explain what this figure means in terms of relative purchasing power.

1

Purchasing power has decreased since 2015. It will cost £110.40 in April 2021 to buy the same amount of goods and services as £100 cost in 2015.

The price of a new 3-door car rose in line with CPI between April 2015 and April 2021.

In 2021, the price of a new 3-door car was £14,108.

(b) Calculate the price of a new 3-door car in April 2015.

1

$$\frac{110.4}{100} = 1.104$$

$$£14,108 \div 1.104 = 12778.98551$$

The car cost £12,778.99 in 2015.

The National Living Wage is the minimum hourly rate to be paid to any employee aged 23 or older.

In April 2021, the National Living Wage was £8.91. This was raised to £9.50 in April 2022.

(c) Given that the CPI in April 2022 was 119.0, determine whether this rise in the National Living Wage was in line with inflation.

2

$$\text{Relative rate of inflation} = \left(\frac{119.0}{110.4} - 1 \right) \times 100$$

$$= 7.7898... \%$$

$$\text{Expected wage in 2022} = £8.91 \times 1.077898..$$

$$= £9.60$$

∴ The NLW increase was below inflation.



10. You must refer to the information on 'E10 Petrol' given in the pre-release material when answering this question.

At the end of June 2021, the UK government replaced the standard E5 fuel with E10 in a bid to reduce national CO₂ emissions.

A newspaper article stated that:

'Since the nationwide introduction of E10 fuel, CO₂ emissions have reduced to the effect of taking 550 000 cars off the road by the end of 2022.'

(a) (i) Calculate the CO₂ emissions of 550 000 cars. 1

$$350\,000 \text{ cars produce } 750\,000 \text{ tonnes} \quad \div 7$$

$$\therefore 50\,000 \text{ cars produce } 107,143 \text{ tonnes} \quad \times 11$$

$$\hookrightarrow 550\,000 \text{ cars produce } \underline{1,178,571 \text{ tonnes}}$$

(ii) Suggest a reason why the information from the newspaper article might not be appropriate as part of any further research on reducing CO₂ emissions. 1

The newspaper article may be biased. We'd need to check their source.

The fuel economy of a car, F miles per gallon (mpg), is reduced when it carries an additional load of m kilograms.

The fuel economy of a small car is modelled using the following equation:

$$F = 73.6 \times 0.98^{\frac{m}{45}}$$

(b) (i) State the independent variable. 1

Load, m

(ii) Estimate the fuel economy of the small car when it is carrying an additional load of 150 kg. 1

$$m = 150 \quad F = 73.6 \times 0.98^{\frac{150}{45}}$$

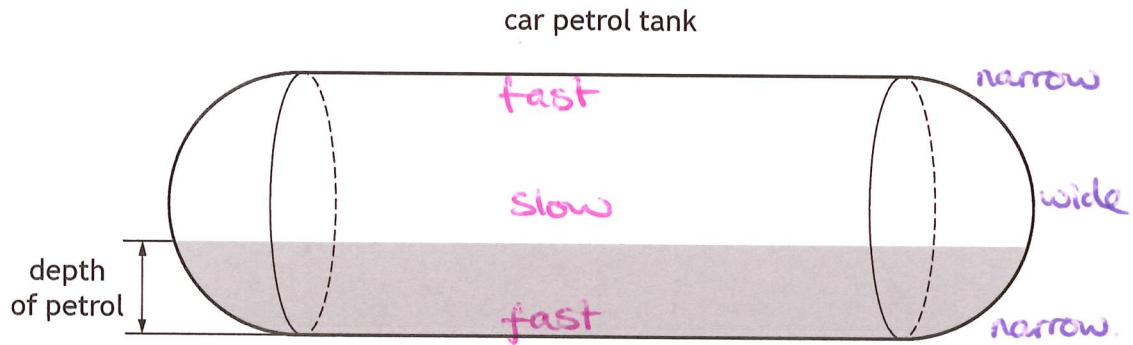
$$= 68.8068\dots$$
Fuel economy ≈ 68.8 mpg.



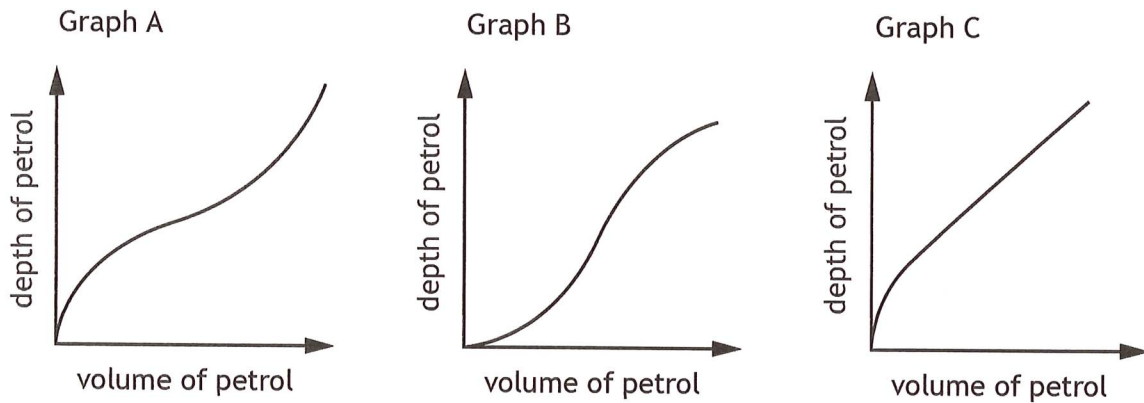
10. (continued)

A customer is filling up their tank with petrol.

The shape of the petrol tank inside the car is a horizontal cylinder with two hemispheres on either side as shown in the diagram.



The three diagrams below show how the depth of petrol varies with the volume of petrol in the tank.



(c) Explain which graph could model the depth of petrol in the tank.

2

Graph A could model the depth of petrol in the tank as the cylindrical tank will see the depth increase quickly at the start, the slow down in the middle, then get faster towards the end.



* X 8 4 4 7 6 0 1 1 4 *

11. You must refer to the spreadsheet file 'Q11 Ramsay's Loan.xlsx' when answering this question.

You must complete parts (a) (i), (a) (ii), (c) (i), and (c) (ii) using the spreadsheet file.

Part (b) must be completed in the space provided.

Ramsay applies to take out a loan of £6000 with a term of 3 years from a bank.

Level monthly repayments are made at the end of each month.

The effective annual interest rate is 6.3%.

Open the 'Bank Loan' worksheet.

- (a) (i) Complete the 'Bank loan repayment schedule' to determine the level monthly repayment amount, and the final repayment amount. 4
- (ii) Determine the total interest paid over the term of the loan. 1

Ramsay's application for this loan was rejected.

- (b) State one reason why a bank might reject a loan application. 1

Ramsay might have a poor credit rating, or he cannot afford to make the repayments.

Ramsay decides to borrow the money from a loan company.

The loan company offers Ramsay £6000 for 3 years with fixed level monthly repayments of £250 made at the end of each month.

Open the 'Loan Company' worksheet.

- (c) (i) Complete the 'Loan company repayment schedule' to find the annual effective rate of interest. 2
- (ii) Determine the difference in total interest paid (in £) between the two loans. 1

Print the 'Bank Loan' worksheet in value view and formula view. Print the 'Loan Company' worksheet in value view and formula view.

[END OF QUESTION PAPER]



	A	B	C	D	E	F
1		Name:	H WALLACE			
2		SCN:				
3		Centre name:	WORKED SOLUTION			
4						
5		Bank loan repayment schedule				
6		Initial loan amount	£6,000.00			
7		Annual effective interest rate	6.3%			
8		Monthly effective interest rate	0.510%		VALUE VIEW.	
9		Loan period (years)	3			
10		Monthly repayment amount	£182.87			
11		Final repayment amount	£182.94			
12						
13		Total interest paid	£583.39			
14						
15		Time (months)	Repayment (£)	Interest content of repayment (£)	Capital content of repayment (£)	Loan outstanding (£)
16		0				6,000.00
17		1	£182.87	30.63	£152.24	5,847.76
18		2	£182.87	29.85	£153.02	5,694.74
19		3	£182.87	29.07	£153.80	5,540.94
20		4	£182.87	28.28	£154.59	5,386.35
21		5	£182.87	27.49	£155.38	5,230.97
22		6	£182.87	26.70	£156.17	5,074.80
23		7	£182.87	25.90	£156.97	4,917.83
24		8	£182.87	25.10	£157.77	4,760.06
25		9	£182.87	24.30	£158.57	4,601.49
26		10	£182.87	23.49	£159.38	4,442.11
27		11	£182.87	22.67	£160.20	4,281.91
28		12	£182.87	21.86	£161.01	4,120.90
29		13	£182.87	21.03	£161.84	3,959.06
30		14	£182.87	20.21	£162.66	3,796.40
31		15	£182.87	19.38	£163.49	3,632.91
32		16	£182.87	18.54	£164.33	3,468.58
33		17	£182.87	17.70	£165.17	3,303.41
34		18	£182.87	16.86	£166.01	3,137.40
35		19	£182.87	16.01	£166.86	2,970.54
36		20	£182.87	15.16	£167.71	2,802.83
37		21	£182.87	14.31	£168.56	2,634.27
38		22	£182.87	13.45	£169.42	2,464.85
39		23	£182.87	12.58	£170.29	2,294.56
40		24	£182.87	11.71	£171.16	2,123.40
41		25	£182.87	10.84	£172.03	1,951.37
42		26	£182.87	9.96	£172.91	1,778.46
43		27	£182.87	9.08	£173.79	1,604.67
44		28	£182.87	8.19	£174.68	1,429.99
45		29	£182.87	7.30	£175.57	1,254.42
46		30	£182.87	6.40	£176.47	1,077.95
47		31	£182.87	5.50	£177.37	900.58
48		32	£182.87	4.60	£178.27	722.31
49		33	£182.87	3.69	£179.18	543.13
50		34	£182.87	2.77	£180.10	363.03
51		35	£182.87	1.85	£181.02	182.01
52		36	£182.94	0.93	£182.01	0.00

A	B	C	D	E	F
1	Name:	H WALLACE			
2	SCN:				
3	Centre name:	WORKED SOLUTION			
4					
5	Bank loan repayment schedule				
6	Initial loan amount	6000			
7	Annual effective interest rate	0.063			
8	Monthly effective interest rate	$=((1+C7)^(1/12))-1$		FORMULAE VIEW.	
9	Loan period (years)	3			
10	Monthly repayment amount	182.87			
11	Final repayment amount	=C52			
12					
13	Total interest paid	=SUM(D17:D52)			
14					
15	Time (months)	Repayment (£)	Interest content of repayment (£)	Capital content of repayment (£)	Loan outstanding (£)
16	0				6000
17	1	=\$C\$10	=ROUND(\$C\$8*F16,2)	=C17-D17	=F16-E17
18	2	=\$C\$10	=ROUND(\$C\$8*F17,2)	=C18-D18	=F17-E18
19	3	=\$C\$10	=ROUND(\$C\$8*F18,2)	=C19-D19	=F18-E19
20	4	=\$C\$10	=ROUND(\$C\$8*F19,2)	=C20-D20	=F19-E20
21	5	=\$C\$10	=ROUND(\$C\$8*F20,2)	=C21-D21	=F20-E21
22	6	=\$C\$10	=ROUND(\$C\$8*F21,2)	=C22-D22	=F21-E22
23	7	=\$C\$10	=ROUND(\$C\$8*F22,2)	=C23-D23	=F22-E23
24	8	=\$C\$10	=ROUND(\$C\$8*F23,2)	=C24-D24	=F23-E24
25	9	=\$C\$10	=ROUND(\$C\$8*F24,2)	=C25-D25	=F24-E25
26	10	=\$C\$10	=ROUND(\$C\$8*F25,2)	=C26-D26	=F25-E26
27	11	=\$C\$10	=ROUND(\$C\$8*F26,2)	=C27-D27	=F26-E27
28	12	=\$C\$10	=ROUND(\$C\$8*F27,2)	=C28-D28	=F27-E28
29	13	=\$C\$10	=ROUND(\$C\$8*F28,2)	=C29-D29	=F28-E29
30	14	=\$C\$10	=ROUND(\$C\$8*F29,2)	=C30-D30	=F29-E30
31	15	=\$C\$10	=ROUND(\$C\$8*F30,2)	=C31-D31	=F30-E31
32	16	=\$C\$10	=ROUND(\$C\$8*F31,2)	=C32-D32	=F31-E32
33	17	=\$C\$10	=ROUND(\$C\$8*F32,2)	=C33-D33	=F32-E33
34	18	=\$C\$10	=ROUND(\$C\$8*F33,2)	=C34-D34	=F33-E34
35	19	=\$C\$10	=ROUND(\$C\$8*F34,2)	=C35-D35	=F34-E35
36	20	=\$C\$10	=ROUND(\$C\$8*F35,2)	=C36-D36	=F35-E36
37	21	=\$C\$10	=ROUND(\$C\$8*F36,2)	=C37-D37	=F36-E37
38	22	=\$C\$10	=ROUND(\$C\$8*F37,2)	=C38-D38	=F37-E38
39	23	=\$C\$10	=ROUND(\$C\$8*F38,2)	=C39-D39	=F38-E39
40	24	=\$C\$10	=ROUND(\$C\$8*F39,2)	=C40-D40	=F39-E40
41	25	=\$C\$10	=ROUND(\$C\$8*F40,2)	=C41-D41	=F40-E41
42	26	=\$C\$10	=ROUND(\$C\$8*F41,2)	=C42-D42	=F41-E42
43	27	=\$C\$10	=ROUND(\$C\$8*F42,2)	=C43-D43	=F42-E43
44	28	=\$C\$10	=ROUND(\$C\$8*F43,2)	=C44-D44	=F43-E44
45	29	=\$C\$10	=ROUND(\$C\$8*F44,2)	=C45-D45	=F44-E45
46	30	=\$C\$10	=ROUND(\$C\$8*F45,2)	=C46-D46	=F45-E46
47	31	=\$C\$10	=ROUND(\$C\$8*F46,2)	=C47-D47	=F46-E47

	A	B	C	D	E	F
1		Name: H WALLACE				
2		SCN:				
3		Centre name: WORKED SOLUTION				
4						
5		Bank loan repayment schedule				
48	32	=C\$10	=ROUND(C\$8*F47,2)	=C48-D48	=F47-E48	
49	33	=C\$10	=ROUND(C\$8*F48,2)	=C49-D49	=F48-E49	
50	34	=C\$10	=ROUND(C\$8*F49,2)	=C50-D50	=F49-E50	
51	35	=C\$10	=ROUND(C\$8*F50,2)	=C51-D51	=F50-E51	
52	36	=C\$10+0.07	=ROUND(C\$8*F51,2)	=C52-D52	=F51-E52	

	A	B	C	D	E	F
1		Name:	H WALLACE			
2		SCN:				
3		Centre name:	WORKED SOLUTION			
4						
5		Loan company repayment schedule				
6		Initial loan amount	£6,000.00			
7		Annual effective interest rate	32.61%		VALUE VIEW	
8		Monthly effective interest rate	2.38%			
9		Loan period (years)	3			
10		Fixed monthly repayment amount	£250.00			
11						
12		Total interest paid	£3,000.00			
13						
14		Difference in total interest paid	£2,416.61			
15						
16		Time (months)	Repayment (£)	Interest content of repayment (£)	Capital content of repayment (£)	Loan outstanding (£)
17		0				6,000.00
18		1	£250.00	142.80	£107.20	5,892.80
19		2	£250.00	140.25	£109.75	5,783.05
20		3	£250.00	137.64	£112.36	5,670.69
21		4	£250.00	134.96	£115.04	5,555.65
22		5	£250.00	132.22	£117.78	5,437.87
23		6	£250.00	129.42	£120.58	5,317.29
24		7	£250.00	126.55	£123.45	5,193.84
25		8	£250.00	123.61	£126.39	5,067.45
26		9	£250.00	120.60	£129.40	4,938.05
27		10	£250.00	117.53	£132.47	4,805.58
28		11	£250.00	114.37	£135.63	4,669.95
29		12	£250.00	111.14	£138.86	4,531.09
30		13	£250.00	107.84	£142.16	4,388.93
31		14	£250.00	104.46	£145.54	4,243.39
32		15	£250.00	100.99	£149.01	4,094.38
33		16	£250.00	97.45	£152.55	3,941.83
34		17	£250.00	93.82	£156.18	3,785.65
35		18	£250.00	90.10	£159.90	3,625.75
36		19	£250.00	86.29	£163.71	3,462.04
37		20	£250.00	82.40	£167.60	3,294.44
38		21	£250.00	78.41	£171.59	3,122.85
39		22	£250.00	74.32	£175.68	2,947.17
40		23	£250.00	70.14	£179.86	2,767.31
41		24	£250.00	65.86	£184.14	2,583.17
42		25	£250.00	61.48	£188.52	2,394.65
43		26	£250.00	56.99	£193.01	2,201.64
44		27	£250.00	52.40	£197.60	2,004.04
45		28	£250.00	47.70	£202.30	1,801.74
46		29	£250.00	42.88	£207.12	1,594.62
47		30	£250.00	37.95	£212.05	1,382.57
48		31	£250.00	32.91	£217.09	1,165.48
49		32	£250.00	27.74	£222.26	943.22
50		33	£250.00	22.45	£227.55	715.67
51		34	£250.00	17.03	£232.97	482.70
52		35	£250.00	11.49	£238.51	244.19
53		36	£250.00	5.81	£244.19	0.00

A	B	C	D	E	F
1	Name:	H WALLACE			
2	SCN:				
3	Centre name:	WORKED SOLUTION			
4					
5	Loan company repayment schedule				
6	Initial loan amount	6000			
7	Annual effective interest rate	$=(1+C8)^{12}-1$		FORMULAE VIEW	
8	Monthly effective interest rate	0.0237999243757137			
9	Loan period (years)	3			
10	Fixed monthly repayment amount	250			
11					
12	Total interest paid	$=SUM(D18:D53)$			
13					
14	Difference in total interest paid	$=C12-Bank Loan!C13$			
15					
16	Time (months)	Repayment (£)	Interest content of repayment (£)	Capital content of repayment (£)	Loan outstanding (£)
17	0				6000
18	1	$=\$C\10	$=ROUND(\$C\$8*F17,2)$	$=C18-D18$	$=F17-E18$
19	2	$=\$C\10	$=ROUND(\$C\$8*F18,2)$	$=C19-D19$	$=F18-E19$
20	3	$=\$C\10	$=ROUND(\$C\$8*F19,2)$	$=C20-D20$	$=F19-E20$
21	4	$=\$C\10	$=ROUND(\$C\$8*F20,2)$	$=C21-D21$	$=F20-E21$
22	5	$=\$C\10	$=ROUND(\$C\$8*F21,2)$	$=C22-D22$	$=F21-E22$
23	6	$=\$C\10	$=ROUND(\$C\$8*F22,2)$	$=C23-D23$	$=F22-E23$
24	7	$=\$C\10	$=ROUND(\$C\$8*F23,2)$	$=C24-D24$	$=F23-E24$
25	8	$=\$C\10	$=ROUND(\$C\$8*F24,2)$	$=C25-D25$	$=F24-E25$
26	9	$=\$C\10	$=ROUND(\$C\$8*F25,2)$	$=C26-D26$	$=F25-E26$
27	10	$=\$C\10	$=ROUND(\$C\$8*F26,2)$	$=C27-D27$	$=F26-E27$
28	11	$=\$C\10	$=ROUND(\$C\$8*F27,2)$	$=C28-D28$	$=F27-E28$
29	12	$=\$C\10	$=ROUND(\$C\$8*F28,2)$	$=C29-D29$	$=F28-E29$
30	13	$=\$C\10	$=ROUND(\$C\$8*F29,2)$	$=C30-D30$	$=F29-E30$
31	14	$=\$C\10	$=ROUND(\$C\$8*F30,2)$	$=C31-D31$	$=F30-E31$
32	15	$=\$C\10	$=ROUND(\$C\$8*F31,2)$	$=C32-D32$	$=F31-E32$
33	16	$=\$C\10	$=ROUND(\$C\$8*F32,2)$	$=C33-D33$	$=F32-E33$
34	17	$=\$C\10	$=ROUND(\$C\$8*F33,2)$	$=C34-D34$	$=F33-E34$
35	18	$=\$C\10	$=ROUND(\$C\$8*F34,2)$	$=C35-D35$	$=F34-E35$
36	19	$=\$C\10	$=ROUND(\$C\$8*F35,2)$	$=C36-D36$	$=F35-E36$
37	20	$=\$C\10	$=ROUND(\$C\$8*F36,2)$	$=C37-D37$	$=F36-E37$
38	21	$=\$C\10	$=ROUND(\$C\$8*F37,2)$	$=C38-D38$	$=F37-E38$
39	22	$=\$C\10	$=ROUND(\$C\$8*F38,2)$	$=C39-D39$	$=F38-E39$
40	23	$=\$C\10	$=ROUND(\$C\$8*F39,2)$	$=C40-D40$	$=F39-E40$
41	24	$=\$C\10	$=ROUND(\$C\$8*F40,2)$	$=C41-D41$	$=F40-E41$
42	25	$=\$C\10	$=ROUND(\$C\$8*F41,2)$	$=C42-D42$	$=F41-E42$
43	26	$=\$C\10	$=ROUND(\$C\$8*F42,2)$	$=C43-D43$	$=F42-E43$
44	27	$=\$C\10	$=ROUND(\$C\$8*F43,2)$	$=C44-D44$	$=F43-E44$
45	28	$=\$C\10	$=ROUND(\$C\$8*F44,2)$	$=C45-D45$	$=F44-E45$
46	29	$=\$C\10	$=ROUND(\$C\$8*F45,2)$	$=C46-D46$	$=F45-E46$

	A	B	C	D	E	F
1		Name:	H WALLACE			
2		SCN:				
3		Centre name:	WORKED SOLUTION			
4						
5		Loan company repayment schedule				
47	30	= $\$C\10	=ROUND($\$C\$8 * F46, 2$)	=C47-D47	=F46-E47	
48	31	= $\$C\10	=ROUND($\$C\$8 * F47, 2$)	=C48-D48	=F47-E48	
49	32	= $\$C\10	=ROUND($\$C\$8 * F48, 2$)	=C49-D49	=F48-E49	
50	33	= $\$C\10	=ROUND($\$C\$8 * F49, 2$)	=C50-D50	=F49-E50	
51	34	= $\$C\10	=ROUND($\$C\$8 * F50, 2$)	=C51-D51	=F50-E51	
52	35	= $\$C\10	=ROUND($\$C\$8 * F51, 2$)	=C52-D52	=F51-E52	
53	36	= $\$C\10	=ROUND($\$C\$8 * F52, 2$)	=C53-D53	=F52-E53	