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EDEXCEL INTERNATIONAL GCSE MATHS: QUESTIONS BY TOPIC

Fractions, Decimals & Percentages (N2)

International GCSE Mathematics A (4MA1) · Higher tier

83 questions · 314 marks · Mark schemes included

Past papers June 2018 - June 2025 · 3 sub-topics

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HOW TO USE THIS BOOKLET

Questions are grouped by sub-topic and run from the lowest to the highest mark tariff, then oldest paper first.

Click any row below to jump straight to that sub-topic or question.

On every question page, click ANSWER in the top-right corner to jump to its mark scheme; < QUESTION brings you back.

A gold bar in the left margin marks exactly where the question sits on the original page.

Diagrams, graphs, grids and tables are printed exactly as they appear in the original papers.

Each question is filed under its main topic; longer questions may also test skills from other topics.

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QUESTIONS

83 questions · 314 marks · 3 sub-topics

SUB-TOPIC N2a

FRACTIONS

Sub-topic N2a · 26 questions · 83 marks · lowest tariff first



4 Show that $3\frac{4}{7} - 1\frac{5}{8} = 1\frac{53}{56}$

(Total for Question 4 is 3 marks)



Answer ALL TWENTY THREE questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 Show that $1\frac{2}{3} + 2\frac{3}{4} = 4\frac{5}{12}$

(Total for Question 1 is 3 marks)



Answer ALL TWENTY FOUR questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 Show that $4\frac{2}{3} \div 1\frac{1}{9} = 4\frac{1}{5}$

(Total for Question 1 is 3 marks)

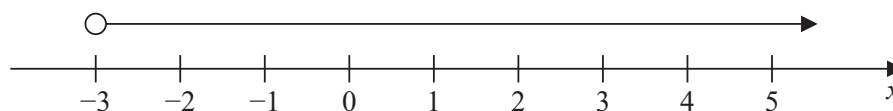


Answer ALL TWENTY FOUR questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 (a)



Write down the inequality shown on the number line.

.....
(1)

(b) Solve the inequality $4y - 13 \leq y + 8$

.....
(2)

(Total for Question 1 is 3 marks)

2 Show that $5\frac{2}{3} - 2\frac{3}{4} = 2\frac{11}{12}$

(Total for Question 2 is 3 marks)



Answer ALL TWENTY THREE questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

- 1** Brendon, Asha and Julie share some money in the ratios 3 : 2 : 6
The **total** amount of money that Asha and Julie receive is \$36

Work out the amount of money that Brendon receives.

\$.....

(Total for Question 1 is 3 marks)

- 2** Show that $3\frac{1}{5} \times 2\frac{5}{8} = 8\frac{2}{5}$

(Total for Question 2 is 3 marks)



3 Show that $4\frac{2}{3} + 3\frac{4}{5} = 8\frac{7}{15}$

(Total for Question 3 is 3 marks)



Answer ALL TWENTY THREE questions.

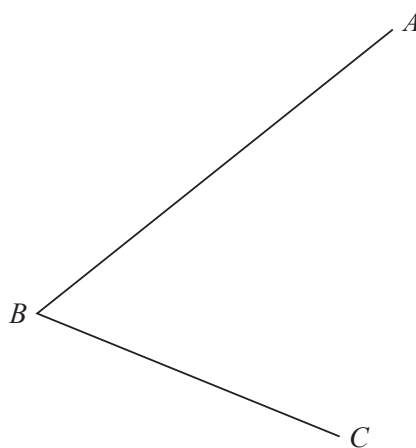
Write your answers in the spaces provided.

You must write down all the stages in your working.

1 Show that $3\frac{3}{4} \times \frac{7}{9} = 2\frac{11}{12}$

(Total for Question 1 is 3 marks)

- 2 Using ruler and compasses only, construct the bisector of angle ABC .
You must show all your construction lines.



(Total for Question 2 is 2 marks)



Answer ALL TWENTY TWO questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 Show that $3\frac{1}{5} \times 1\frac{5}{6} = 5\frac{13}{15}$

(Total for Question 1 is 3 marks)



10 The people working for a company work in Team A or in Team B.

number of people in Team A : number of people in Team B = 3 : 4

$\frac{4}{5}$ of Team A work full time.

24% of Team B work full time.

Work out what fraction of the people working for the company work full time.
Give your fraction in its simplest form.

(Total for Question 10 is 3 marks)



2 Show that $2\frac{4}{7} \div 1\frac{1}{8} = 2\frac{2}{7}$

(Total for Question 2 is 3 marks)

- 3 The bearing of Paris from London is 149°
Work out the bearing of London from Paris.

(Total for Question 3 is 2 marks)



2 Show that $6\frac{3}{4} \div 2\frac{4}{7} = 2\frac{5}{8}$

(Total for Question 2 is 3 marks)



6 Show that $2\frac{2}{3} + 3\frac{3}{4} = 6\frac{5}{12}$

(Total for Question 6 is 3 marks)



- 3 An aeroplane travelled from New York City to Los Angeles.

The aeroplane travelled a distance of 3980 kilometres in 5 hours 24 minutes.

Work out the average speed of the aeroplane.

Give your answer in kilometres per hour correct to the nearest whole number.

..... kilometres per hour

(Total for Question 3 is 3 marks)

- 4 Show that $5\frac{1}{3} - 2\frac{6}{7} = 2\frac{10}{21}$

(Total for Question 4 is 3 marks)



Answer ALL TWENTY SIX questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 Show that $3\frac{5}{7} \div 1\frac{5}{8} = 2\frac{2}{7}$

(Total for Question 1 is 3 marks)

- 2** Change a speed of 90 kilometres per hour to a speed in metres per second.
Show your working clearly.

..... m/s

(Total for Question 2 is 3 marks)



Answer ALL TWENTY SIX questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 Show that $4\frac{2}{3} \div 1\frac{5}{6} = 2\frac{6}{11}$

(Total for Question 1 is 3 marks)



Answer ALL TWENTY FIVE questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 Show that $4\frac{2}{3} \div 1\frac{1}{5} = 3\frac{8}{9}$

(Total for Question 1 is 3 marks)



6 Show that $3\frac{3}{7} \div 2\frac{2}{3} = 1\frac{2}{7}$

(Total for Question 6 is 3 marks)

- 7 Hermione buys a boat for \$26 800
The value of the boat depreciates by 8% each year.
- Work out the value of the boat at the end of 3 years.
Give your answer correct to the nearest dollar.

\$.....

(Total for Question 7 is 3 marks)



4 Show that $2\frac{1}{3} \div 5\frac{1}{4} = \frac{4}{9}$

(Total for Question 4 is 3 marks)

- 5 Slavomir invests 5200 euros in a savings account for 4 years.
He gets 2.5% per year compound interest.

Work out how much money Slavomir will have in the savings account
at the end of 4 years.

Give your answer correct to the nearest euro.

..... euros

(Total for Question 5 is 3 marks)



- 3 A plane takes 9 hours 36 minutes to fly from New Delhi to Perth.

The plane flies at an average speed of 820 km/h.

Work out the total distance the plane flies.

..... km

(Total for Question 3 is 3 marks)

- 4 Show that $2\frac{4}{7} \times 3\frac{1}{9} = 8$

(Total for Question 4 is 3 marks)



Answer ALL TWENTY FIVE questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 Show that $1\frac{5}{7} \times 2\frac{3}{16} = 3\frac{3}{4}$

(Total for Question 1 is 3 marks)

2 The length of a table is measured as 1.4 metres correct to one decimal place.

(a) Write down the upper bound of the length of the table.

..... metres
(1)

(b) Write down the lower bound of the length of the table.

..... metres
(1)

(Total for Question 2 is 2 marks)



2 The length of a ship is 142.8 m, correct to 1 decimal place.

(i) Write down the lower bound of the length of the ship.

..... m
(1)

(ii) Write down the upper bound of the length of the ship.

..... m
(1)

(Total for Question 2 is 2 marks)

3 Show that $2\frac{1}{4} \times 1\frac{5}{7} = 3\frac{6}{7}$

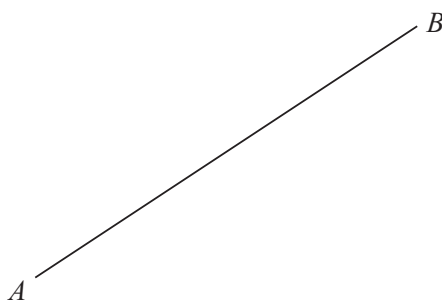
(Total for Question 3 is 3 marks)



3 Show that $7\frac{1}{3} - 3\frac{4}{7} = 3\frac{16}{21}$

(Total for Question 3 is 3 marks)

- 4 Using ruler and compasses only, construct the perpendicular bisector of the line AB
Show all your construction lines.



(Total for Question 4 is 2 marks)



13 Each month Edna spends all her income on rent, on travel and on other living expenses.

She spends $\frac{1}{3}$ of her income on rent.

She spends $\frac{1}{5}$ of her income on travel.

She spends \$420 of her income on other living expenses.

Work out her income each month.

\$.....

(Total for Question 13 is 4 marks)



- 2 There are 60 children in a club.

In the club, the ratio of the number of girls to the number of boys is 3 : 1

$\frac{3}{5}$ of the girls play a musical instrument.

$\frac{4}{5}$ of the boys play a musical instrument.

What fraction of the 60 children play a musical instrument?

(Total for Question 2 is 4 marks)



Answer ALL TWENTY FOUR questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

- 1** Pieter owns a currency conversion shop.

Last Monday, Pieter changed a total of 20 160 rand into a number of different currencies.

He changed $\frac{3}{10}$ of the 20 160 rand into euros.

He changed the rest of the rands into dollars, rupees and francs in the ratios 9 : 5 : 2

Pieter changed more rands into dollars than he changed into francs.

Work out how many more.

..... rand

(Total for Question 1 is 4 marks)



13 Antoine is going on holiday.

He makes 3 separate payments to cover the total cost of his holiday.

The following table shows how much money Antoine pays to the holiday company.

Payment	Amount paid
Payment 1	$\frac{3}{8}$ of the total cost
Payment 2	45% of the total cost
Payment 3	\$406

Work out how much Antoine has to pay for Payment 2

\$

(Total for Question 13 is 5 marks)



SUB-TOPIC N2b

DECIMALS & CONVERSIONS

Sub-topic N2b · 16 questions · 44 marks · lowest tariff first



15 Use algebra to show that the recurring decimal $0.2\dot{5}\dot{4} = \frac{14}{55}$

(Total for Question 15 is 2 marks)

16 Here are the first five terms of an arithmetic sequence.

7 10 13 16 19

Find the sum of the first 100 terms of this sequence.

(Total for Question 16 is 2 marks)



12 Given that $\frac{3^x}{9^{3x}} = 81$

find the value of x .

Show clear algebraic working.

$$x = \dots\dots\dots$$

(Total for Question 12 is 3 marks)

13 Use algebra to show that $0.6\dot{8}\dot{1} = \frac{15}{22}$

(Total for Question 13 is 2 marks)



16 Use algebra to show that the recurring decimal $0.28\dot{1}\dot{3} = \frac{557}{1980}$

(Total for Question 16 is 2 marks)

17 Using algebra, prove that, given any 3 consecutive even numbers, the difference between the square of the largest number and the square of the smallest number is always 8 times the middle number.

(Total for Question 17 is 3 marks)



Complete the table below with the letter of the graph that could represent each given equation. Write each answer on the dotted line.

Equation	Graph
$y = -2x + 3$	
$y = -\frac{1}{x}$	
$y = \tan x^\circ$	
$y = (x + 1)(x - 1)(x - 2)$	

(Total for Question 16 is 3 marks)

17 Use algebra to show that $0.3\dot{4}\dot{5} = \frac{19}{55}$

(Total for Question 17 is 2 marks)



12 Solve $2^{-4x} = 32$

$x =$

(Total for Question 12 is 2 marks)

13 Use algebra to show that $0.3\dot{8}\dot{1} = \frac{21}{55}$

(Total for Question 13 is 2 marks)



- 15** Here is a list giving the numbers of runs scored last week by the eleven members of cricket team **A**.

2 3 4 6 21 26 27 32 34 61 72

The interquartile range of the numbers of runs scored last week by the eleven members of cricket team **B** was 42

Using a suitable calculation, write down one comparison between the numbers of runs scored by the members of cricket team **A** and the members of cricket team **B**.
Show your working clearly.

(Total for Question 15 is 3 marks)

- 16** Use algebra to show that $0.4\dot{3}\dot{8} = \frac{217}{495}$

(Total for Question 16 is 2 marks)



16 Use algebra to show that $0.1\dot{7}\dot{6} = \frac{35}{198}$

(Total for Question 16 is 2 marks)

17 F is inversely proportional to the square of r

$$F = 36 \text{ when } r = 4$$

(a) Find a formula for F in terms of r

.....
(3)

(b) Work out the value of F when $r = 48$

.....
(1)

(Total for Question 17 is 4 marks)



18 Use algebra to show that $0.\dot{3}0\dot{6} = \frac{34}{111}$

(Total for Question 18 is 2 marks)



14 Given that $\frac{3^{2n+3}}{3^4} = 3^3 \times 3^{1-2n}$

find the value of n

Show your working clearly.

$$n = \dots\dots\dots$$

(Total for Question 14 is 3 marks)

15 Use algebra to show that $0.7\overline{63} = \frac{42}{55}$

(Total for Question 15 is 2 marks)



16 Use algebra to show that the recurring decimal $0.\dot{6}\dot{1}\dot{2} = \frac{101}{165}$

(Total for Question 16 is 2 marks)



18 Use algebra to show that $0.\dot{7}0\dot{2} = \frac{26}{37}$

(Total for Question 18 is 2 marks)

19 Solve the inequality $4x^2 + 4x - 15 < 0$
Show clear algebraic working.

(Total for Question 19 is 3 marks)



- 18** $0.4\dot{x}$ is a recurring decimal.
 x is a whole number such that $1 \leq x \leq 9$

Find, in terms of x , the recurring decimal $0.4\dot{x}$ as a fraction.
Give your fraction in its simplest form.
Show clear algebraic working.

.....
(Total for Question 18 is 3 marks)



13 (a) Use algebra to show that $0.5\dot{7}\dot{2} = \frac{63}{110}$

(2)

Given that y is a prime number,

(b) express $\frac{3}{2 - \sqrt{y}}$ in the form $\frac{a + b\sqrt{y}}{c - y}$ where a , b and c are integers.

(2)

(Total for Question 13 is 4 marks)



17 (a) Use algebra to show that $0.4\dot{3}\dot{6} = \frac{24}{55}$

(2)

(b) Show that $\frac{\sqrt{20} + \sqrt{80}}{\sqrt{3}}$ can be expressed in the form $\sqrt{a}$ where a is an integer.

Show your working clearly.

(3)

(Total for Question 17 is 5 marks)



15 (a) Use algebra to show that $4.\dot{5}\dot{7} = 4\frac{19}{33}$

(b) Show that $\frac{2}{6 - 3\sqrt{2}}$ can be written in the form $\frac{a + \sqrt{a}}{b}$ (2)
where a and b are integers.
Show your working clearly.

(3)

(Total for Question 15 is 5 marks)



15 (a) Use algebra to show that $0.3\dot{7}\dot{2} = \frac{41}{110}$

(2)

(b) Express $\frac{\sqrt{125} + \sqrt{80}}{\sqrt{3}}$ in the form $\sqrt{n}$ where n is an integer.
Show your working clearly.

(3)

(Total for Question 15 is 5 marks)



SUB-TOPIC N2c

PERCENTAGES

Sub-topic N2c · 41 questions · 187 marks · lowest tariff first



- 3 Here are the first five terms of a number sequence S .

10 16 22 28 34

- (a) Find an expression, in terms of n , for the n th term of this sequence.

(2)

The n th term of a sequence T is given by $n^2 - 3$

There are numbers that are terms in both the sequence S and the sequence T .

- (b) Find one of these numbers.

(2)

(Total for Question 3 is 4 marks)

- 4 On Saturday, Jacob walked 10 800 steps.
On Sunday, he walked 7% more steps than on Saturday.

Work out how many steps Jacob walked on Sunday.

(Total for Question 4 is 3 marks)



- 12 Freddie recorded the number of runs he scored in each of 11 cricket matches.
Here are his results.

4 0 21 32 51 6 102 69 17 9 42

Find the interquartile range of his results.

(Total for Question 12 is 3 marks)

- 13 Carlos, Flavia and Tazia shared £861 between themselves.

The amount of money Flavia got is 65% of the amount of money Carlos got.

The amount of money Tazia got is 22% **more** than the amount of money Carlos got.

Work out how much money Carlos got.

£

(Total for Question 13 is 3 marks)



- 6 Solve $x^2 - 5x - 36 = 0$
Show clear algebraic working.

.....

(Total for Question 6 is 3 marks)

- 7 In a sale, the normal price of a hat is reduced by 15%
The sale price of the hat is 20.40 euros.
Work out the normal price of the hat.

..... euros

(Total for Question 7 is 3 marks)



9 In a sale, normal prices are reduced by 20%

A bag costs 1080 rupees in the sale.

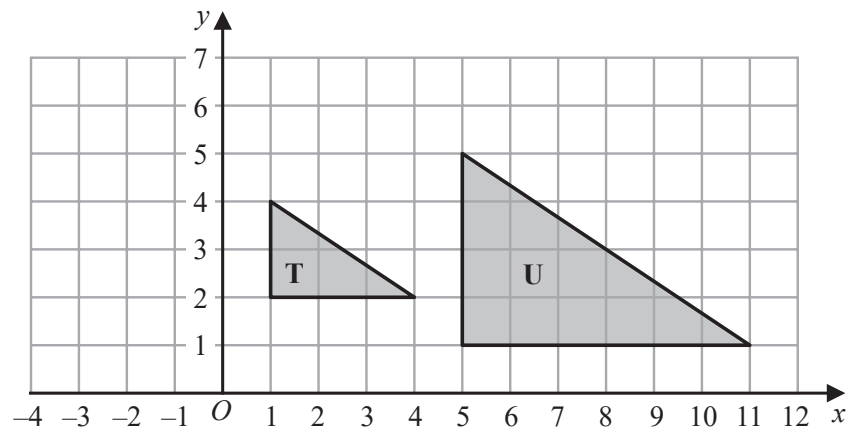
Work out the normal price of the bag.

..... rupees

(Total for Question 9 is 3 marks)



Here are triangle **T** and triangle **U** drawn on a grid of squares.



(c) Describe fully the single transformation that maps triangle **T** onto triangle **U**.

.....

.....

(3)

(Total for Question 5 is 6 marks)

- 6 On Wednesday, the price of 1 litre of petrol was £1.26
The price of petrol on Wednesday was 5% more than the price of petrol on the previous Monday.

Calculate the price of 30 litres of petrol on the previous Monday.

£.....

(Total for Question 6 is 3 marks)



- 8 In 2018, the population of Sydney was 5.48 million.
This was 22% of the total population of Australia.

Work out the total population of Australia in 2018
Give your answer correct to 3 significant figures.

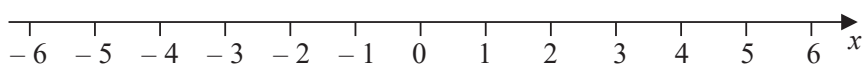
..... million

(Total for Question 8 is 3 marks)

- 9 (i) Solve the inequalities $-7 \leq 2x - 3 < 5$

.....
(3)

- (ii) On the number line, represent the solution set to part (i)



(2)

(Total for Question 9 is 5 marks)



- 6 Victor buys 12 bottles of apple juice for a total cost of \$21
Victor sells all 12 bottles at \$2.45 each bottle.

Work out Victor's percentage profit.

.....%

(Total for Question 6 is 3 marks)



7 $\frac{2^k}{4^n} = 2^x$

Find an expression for x in terms of k and n

$x = \dots\dots\dots$

(Total for Question 7 is 2 marks)

- 8 A cinema increased the cost of an adult ticket by 12%
After the increase, the cost of an adult ticket was £18.20
Work out the cost of an adult ticket before the increase.

£.....

(Total for Question 8 is 3 marks)



13 A rectangle has length L and width W

L is increased by 20%

W is decreased by 35%

Calculate the percentage reduction in the area of the rectangle.

.....%

(Total for Question 13 is 3 marks)



- 3 Find the highest common factor (HCF) of 72 and 108
Show your working clearly.

.....
(Total for Question 3 is 2 marks)

- 4 Ava records the number of kilometres she drives each month.
In April, Ava drove 943 kilometres.
This is 15% more than the number of kilometres she drove in March.
Work out the number of kilometres Ava drove in March.

..... kilometres
(Total for Question 4 is 3 marks)



7 $\frac{3^{-2} \times 3^5}{3^{10}} = 3^n$

Find the value of n

$$n = \dots\dots\dots$$

(Total for Question 7 is 2 marks)

- 8 In a sale, all normal prices are reduced by 17%

The sale price of a fridge is 6225 rupees.

Work out the normal price of the fridge.

..... rupees

(Total for Question 8 is 3 marks)



4 $x^5 \times x^7 = x^m$

(a) Find the value of m

$$m = \dots\dots\dots (1)$$

$$y^8 \div y^3 = y^n$$

(b) Find the value of n

$$n = \dots\dots\dots (1)$$

(c) Simplify fully $(5a^4r^2)^3$

$$\dots\dots\dots (2)$$

(Total for Question 4 is 4 marks)

- 5 In a sale, normal prices are reduced by 28%
The sale price of a watch is 198 euros.

Work out the normal price of the watch.

$\dots\dots\dots$ euros

(Total for Question 5 is 3 marks)



- 7 Tim buys a bracelet for 4000 Swiss francs.
The value of the bracelet increases by 7% each year.

Work out the value of the bracelet at the end of 3 years.
Give your answer correct to the nearest Swiss franc.

..... Swiss francs

(Total for Question 7 is 3 marks)

- 8 Solve the simultaneous equations

$$\begin{aligned}3x + 5y &= 8 \\4x + y &= -3.5\end{aligned}$$

Show clear algebraic working.

$$x = \dots\dots\dots$$

$$y = \dots\dots\dots$$

(Total for Question 8 is 3 marks)



- 9 In a sale, normal prices are reduced by 15%

The sale price of a dishwasher is 612 Swiss francs.

Work out the normal price of the dishwasher.

..... Swiss francs

(Total for Question 9 is 3 marks)

- 10 A straight line, **L**, is parallel to the line with equation $y = 2 - 5x$

The line **L** passes through the point (0, 6)

Find an equation of the line **L**

.....
(Total for Question 10 is 2 marks)



- 2 Work out the difference between the largest share and the smallest share when 3450 yen is divided in the ratios 2:6:7

..... yen

(Total for Question 2 is 3 marks)

- 3 Gopal is paid 20 000 rupees each month.
Jamuna is paid 19 200 rupees each month.

Gopal and Jamuna are both given an increase in their monthly pay.
After the increase, they are both paid the same amount each month.

Gopal was given an increase of 8%

Work out the percentage increase that Jamuna was given.

.....%

(Total for Question 3 is 4 marks)



3 Behnaz makes candles.

She has 6.3 kilograms of wax and uses it all to make candles.

Each candle Behnaz makes uses 210 grams of wax.

Behnaz sells $\frac{2}{5}$ of the candles for \$13 each.

She then reduces this price by 20% and sells the rest of the candles.

Work out the total amount of money Behnaz gets by selling all the candles she made.

\$.....

(Total for Question 3 is 4 marks)



14 Simon bought a house at the beginning of 2018

The value of Simon's house had decreased by 15% by the end of 2018

The house increased in value during both 2019 and 2020

The percentage increases in the value of the house during 2019 and 2020 were the same.

The value of Simon's house at the end of 2020 was 2.85% greater than the amount he paid for his house at the beginning of 2018

Calculate the percentage increase in the value of the house during 2019

.....%

(Total for Question 14 is 4 marks)



- 4 The language department of a college has 180 students.
Each student studies exactly one of French, German, Italian or Spanish.

15 students study French.

45% of the students study German.

Express the percentage of students studying Italian or Spanish as a percentage of those studying French or German.

.....%

(Total for Question 4 is 4 marks)



- 4 Divya and Yuan each pay for a holiday at a special offer price.

Divya's holiday

Normal price: \$1600

Special offer:
16% off the normal price

Yuan's holiday

Normal price: \$1400

Special offer:
 $k\%$ off the normal price

The amount that Divya pays is the same as the amount that Yuan pays.

Work out the value of k

$k = \dots\dots\dots$

(Total for Question 4 is 4 marks)



- 3 Nanette buys 60 notebooks for a total cost of 780 dirhams.

Nanette sells 70% of the notebooks for 22 dirhams each.
She sells the remaining notebooks for 19 dirhams each.

Work out Nanette's percentage profit.
Give your answer correct to 3 significant figures.

.....%

(Total for Question 3 is 4 marks)



3 Joshua buys a car for \$12 500

He sells the car to Nina.

Nina pays

- a deposit of \$1500
- followed by 36 monthly payments of \$450

Work out Joshua's percentage profit.

..... %

(Total for Question 3 is 4 marks)



- 6 Juan wants to buy a ticket to fly from Madrid to Berlin.

He finds two different types of ticket he can buy in a sale, ticket **A** and ticket **B**

ticket **A**
 $\frac{1}{6}$ off normal price

ticket **B**
20% off normal price

The sale price of ticket **A** is 140 euros.

The sale price of ticket **B** is 136 euros.

Work out the difference between the normal price of ticket **A** and the normal price of ticket **B**

..... euros

(Total for Question 6 is 4 marks)



- 7 Shop A and Shop B have offers for buying the same type of laptop.

The normal price of the laptop in Shop A is different to the normal price of the laptop in Shop B

Shop A

Our normal price
£475

Get 16% off our
normal price

Shop B

Get 15% off our
normal price

Only pay £408

Which shop gives more money off their normal price?
Show your working clearly.

(Total for Question 7 is 4 marks)



- 4 Sarah makes and sells mugs.

One day she makes 150 mugs.

Her total cost for making these mugs is £1140

Of these mugs

$\frac{2}{5}$ are small mugs

32% are medium mugs

and the rest are large mugs

Here is Sarah's price list for selling each mug.

MUGS

Small £8.50

Medium £11.20

Large £14.20

Sarah sells all 150 mugs.

Work out her percentage profit.

Give your answer correct to the nearest whole number.

.....%

(Total for Question 4 is 5 marks)



- 8 The table gives information about the average house price in England in 2018 and in 2019

Year	2017	2018	2019
Average house price (£)		228 314	231 776

- (a) Work out the percentage increase in the average house price from 2018 to 2019
Give your answer correct to one decimal place.

..... %
(2)

The average house price in 2019 was 7.7% greater than the average house price in 2017

- (b) Work out the average house price in 2017
Give your answer correct to 3 significant figures.

£
(3)

(Total for Question 8 is 5 marks)



14 The combined savings of Abel and Bahira are 15 435 dinars.

The savings of Bahira are 45% more than the savings of Abel.

The savings of Bahira are $\frac{3}{2}$ times the savings of Chanda.

Work out the savings of Chanda.

..... dinars

(Total for Question 14 is 5 marks)



3 Norberto sells white loaves of bread and brown loaves of bread.

He sells a total of 200 loaves such that

the number of white loaves sold : the number of brown loaves sold = 3 : 2

Norberto sells the white loaves for £1.50 each.

He sells the brown loaves for £1.75 each.

40% of the price of a white loaf is profit.

60% of the price of a brown loaf is profit.

Work out Norberto's total profit when he sells all 200 loaves.

£.....

(Total for Question 3 is 5 marks)



- 4 N is a number.
17% of N is 357

(a) Work out the value of N

$$N = \dots\dots\dots (2)$$

In 2019, the population of a village was 650
In 2020, the population of the village was 806

(b) Work out the percentage increase in the population.

$$\dots\dots\dots \% (3)$$

(Total for Question 4 is 5 marks)



- 4 The table gives information about the price of gold.

	1st February 2016	1st March 2016
Price of one ounce of gold (dollars)	1126.50	1236.50

- (a) Work out the percentage increase in the price of gold between 1st February 2016 and 1st March 2016
Give your answer correct to 3 significant figures.

(3)

%

The price of one ounce of gold on 1st February 2016 was 1126.50 dollars.
The price of gold increased by 19% from 1st February 2016 to 1st July 2016

- (b) Work out the price of one ounce of gold on 1st July 2016
Give your answer correct to the nearest dollar.

(3)

dollars

(Total for Question 4 is 6 marks)



6 Lorenzo increases all the prices on his restaurant menu by 8%

Before the increase, the price of a dessert was \$4.25

(a) Work out the price of the dessert after the increase.

\$
(3)

After the increase, the price of lasagne is \$9.45

(b) Work out the price of lasagne before the increase.

\$
(3)

(Total for Question 6 is 6 marks)



- 5 In 2017, the population of a village was 7500
In 2019, the population of the village was 8265

(a) Work out the percentage increase in the population of the village from 2017 to 2019

..... %
(3)

In a sale, normal prices are reduced by 30%
The sale price of a T-shirt was 31.50 euros.

(b) Work out the normal price of the T-shirt.

..... euros
(3)

(Total for Question 5 is 6 marks)



- 5 Himari's annual salary is 3 130 000 Japanese Yen (JPY).
She gets a salary increase of 4%

(a) Work out Himari's salary after this increase.

.....JPY
(3)

Kaito bought a car.

The value of the car when Kaito bought it was 750 000 JPY.

At the end of each year, the value of his car had depreciated by 15%

- (b) Work out the value of Kaito's car at the end of 3 years.
Give your answer correct to the nearest JPY.

.....JPY
(3)

(Total for Question 5 is 6 marks)



3 Gladys buys a table for \$465 to sell in her shop.

She sells the table for \$520

- (a) Work out the percentage profit that Gladys makes from the sale of the table.
Give your answer correct to 3 significant figures.

..... %
(3)

Gladys has a sale in her shop.

She decreases all the normal prices by 12%

The normal price of an armchair was \$550

- (b) Work out the sale price of the armchair.

\$.....
(3)

(Total for Question 3 is 6 marks)



11 Chengbo sold a house for 180 000 yuan.

The amount for which he sold the house is 24% more than the amount he paid for the house.

- (a) Work out how much Chengbo paid for the house.
Give your answer correct to 3 significant figures.

..... yuan
(3)

Zhi bought a house on 1st January 2017

When she bought the house, its value was 120 000 yuan.

The value of the house increased by 1.8% per year.

- (b) Work out the value of Zhi's house on 1st January 2020
Give your answer correct to 3 significant figures.

..... yuan
(3)

(Total for Question 11 is 6 marks)



6 Asha bought an apartment.

The table gives information about the value of apartments, in euros, and the annual service charge band.

Value (x euros)	Service charge band
$x \geq 700\,000$	A
$600\,000 \leq x < 700\,000$	B
$500\,000 \leq x < 600\,000$	C
$400\,000 \leq x < 500\,000$	D
$0 < x < 400\,000$	E

In 2021, the value of Asha's apartment was 634 400 euros.

The value of Asha's apartment had increased by 4% from its value in 2020

- (a) Has the annual service charge band changed for Asha's apartment?
Show your working clearly.

(3)

Pam bought a boat.

In each year after Pam bought the boat, the value of the boat depreciated by 15%

- (b) Work out the total percentage by which the value of the boat had depreciated by the end of the second year after Pam bought the boat.

..... %

(3)

(Total for Question 6 is 6 marks)



- 2 Anna makes cups.
Each cup costs 6 Swiss francs to make.

Anna puts the cups into boxes to sell.
Each box contains 4 cups.

Anna sells 80 boxes of cups for a total of 2160 Swiss francs.

- (a) Work out the percentage profit Anna makes.
Show your working clearly.

..... %
(4)

The height of each cup is 9 cm, correct to the nearest cm

- (b) Write down the lower bound of the height.

..... cm
(1)

The weight of each cup is 120 g, correct to the nearest 10 g

- (c) Write down the upper bound of the weight.

..... g
(1)

(Total for Question 2 is 6 marks)



12 A company makes cars.

In 2016, the company made 350 cars.

In the first 6 months of 2017, the company made 25 cars each month.

In the last 6 months of 2017, the company made 45 cars each month.

- (a) Work out the percentage increase in the number of cars the company made from 2016 to 2017

..... %
(4)

The company's income in 2017 was \$500 000 more than the company's income in 2016

The company's income in 2017 was 8% more than the company's income in 2016

- (b) Work out the company's income in 2016

\$.....
(3)

(Total for Question 12 is 7 marks)



- 8 The table shows the cost, in euros, of Brigitte's car insurance in each of the years 2016, 2017 and 2018

Year	2016	2017	2018
Cost of insurance (euros)	500	545	592

Brigitte says,

"The percentage increase in the cost of my car insurance from 2017 to 2018 is more than the percentage increase in the cost of my car insurance from 2016 to 2017"

- (a) Is Brigitte correct?

You must show how you get your answer.

(4)

Henri wants to insure his car.

He gets a discount of 15% off the normal price.

Henri pays 952 euros for his car insurance after the discount.

- (b) Work out the discount that Henri gets.

..... euros

(3)

(Total for Question 8 is 7 marks)



- 2 Mary saves for a holiday each year.

In 2020 she saved a total of \$720

In 2021, each month she saved \$78

The total amount Mary saved in 2021 was $P\%$ more than the total she saved in 2020

- (a) Work out the value of P

.....
(4)



Roberto is going to go on holiday.

He has two coupons that will save him money on his holiday.

Coupon A

18% off the cost of the accommodation

Coupon B

12.5% off the total cost of the accommodation **and** the flights

For Roberto's holiday

the cost of the accommodation is \$1600

the cost of the flights is \$800

Roberto can only use one of the coupons.

He wants to save as much money as he can.

(b) Which of the two coupons, **A** or **B**, should he use?

Show your working clearly.

(3)

(Total for Question 2 is 7 marks)



- 6 In his previous job, Pierre was paid 400 euros in total for working a 5-day week.

In his new job, Pierre is paid 14 euros per hour.

In his new job, Pierre works for 7 hours each day for a 5-day week.

- (a) Work out the percentage increase in the amount that Pierre is paid for a 5-day week.

..... %
(4)

Marie changes her job.

Her salary decreases by 6%

Her new salary is 23 030 euros.

- (b) Work out Marie's salary before she changes her job.

..... euros
(3)

(Total for Question 6 is 7 marks)



5 Josh buys and sells books for a living.

He buys 120 books for £4 each.

He sells $\frac{1}{2}$ of the books for £5 each.

He sells 40% of the books for £7 each.

He sells the rest of the books for £8 each.

(a) Calculate Josh's percentage profit.

..... %
(5)

One book that Josh owns had a value of £15 on the 1st May 2019

The value of this book had increased by 20% in the last year.

(b) Find the value of the book on the 1st May 2018

£.....
(3)

(Total for Question 5 is 8 marks)



MARK SCHEMES

official mark schemes, in the same order as the questions



Question	Working	Answer	Mark	Notes
4	$\frac{25}{7}$ and $\frac{13}{8}$		3	M1 correct improper fractions or two improper fractions with a common denominator, at least one correct
	eg $\frac{200}{56} - \frac{91}{56}$ or $\frac{8 \times 25}{56} - \frac{7 \times 13}{56}$			M1 two correct fractions with a common denominator
	$\frac{109}{56} = 1\frac{53}{56}$ Or $\frac{109}{56}$ with RHS shown as $\frac{109}{56}$	correctly shown		A1 dep on M2 with sight of the result of the subtraction eg $\frac{109}{56}$ and $1\frac{53}{56}$ but allow showing that $1\frac{53}{56} = \frac{109}{56}$ on RHS in working
	Alternative method			
	eg $(3)\frac{32}{56} - (1)\frac{35}{56}$		3	M1 two improper fractions, with a common denominator, at least one correct
	$-\frac{3}{56}$			M1 correct subtraction of fractional parts
	$\frac{109}{56}$ or $2 - \frac{3}{56}$	correctly shown		A1 dep on M2 with sight of the result of the subtraction eg $\frac{109}{56}$ or $2 - \frac{3}{56}$
	Alternative method			
	eg $3\frac{32}{56} - 1\frac{35}{56}$		3	M1 two correct fractions with a common denominator, at least one correct
	eg $2\frac{88}{56} - 1\frac{35}{56}$			M1 complete correct method
	$1\frac{53}{56}$	correctly shown		A1 dep on M2
				Total 3 marks

Apart from questions 6, 8, 13b and 24 (where the mark scheme states otherwise) the correct answer, unless clearly obtained from an incorrect method, should be taken to imply a correct method.				
Question	Working	Answer	Mark	Notes
1	$\frac{5}{3} + \frac{11}{4}$	Shown	3	M1 converts to improper fractions
	$\frac{20}{12} + \frac{33}{12}$			M1 converts to fractions with the same common denominator
	$\frac{53}{12} = 4\frac{5}{12}$			A1 Dep on M2
	Alternative method			
	$\frac{2}{3} + \frac{3}{4} = \frac{8}{12} + \frac{9}{12}$	Shown		M1 correct method to add proper fractions
	$\frac{17}{12} = 1\frac{5}{12}$			M1
	$1\frac{5}{12} + 1 + 2 = 4\frac{5}{12}$			A1 Dep on M2

International GCSE Maths					
Apart from questions 1, 11, 12b, 15 (where the mark scheme states otherwise) the correct answer, unless clearly obtained from an incorrect method, should be taken to imply a correct method.					
Question		Working	Answer	Mark	Notes
1		e.g. $\frac{14}{3}$ and $\frac{10}{9}$		3	M1 Both fractions expressed as improper fractions
		e.g. $\frac{14}{3} \times \frac{9}{10}$			M1 or for both fractions expressed as equivalent fractions with denominators that are a common multiple of 3 and 9 eg. $\frac{42}{9} \div \frac{10}{9}$ or $\frac{126}{27} \div \frac{30}{27}$
		e.g. $\frac{14}{3} \times \frac{9}{10} = \frac{126}{30} = \frac{21}{5} = 4\frac{1}{5}$ or $\frac{14}{3} \times \frac{9}{10} = \frac{126}{30} = 4\frac{6}{30} = 4\frac{1}{5}$ or $\frac{14^7}{3^1} \times \frac{9^3}{10^5} = \frac{21}{5} = 4\frac{1}{5}$ or $\frac{126}{27} \div \frac{30}{27} = \frac{126}{30} = \frac{21}{5} = 4\frac{1}{5}$	Shown		A1 Dep on M2 for conclusion to $4\frac{1}{5}$ from correct working – either sight of the result of the multiplication e.g. $\frac{126}{30}$ must be seen or correct cancelling prior to the multiplication to $\frac{21}{5}$ NB: use of decimals scores no marks
					Total 3 marks

International GCSE Maths					
Apart from Q2, 17, 18d, 20, & 24 (where the mark scheme states otherwise) the correct answer, unless obtained from an incorrect method, should be taken to imply a correct method					
Question	Working	Answer	Mark	Notes	
1	(a)	$x > -3$	1	B1	Accept $-3 < x$
	(b)	$4y - y \leq 8 + 13$	2	M1	Arranging y's on one side and the numbers on the other side. (allow $4y - y = 8 + 13$ oe or $4y - y < 8 + 13$ oe or $4y - y > 8 + 13$ oe or $4y - y \geq 8 + 13$ oe)
		$y \leq 7$ oe		A1	Allow $y \leq 21/3$
Total 3 marks					
2		$\frac{17}{3}(-)\frac{11}{4}$ or $5\frac{8}{12}(-)2\frac{9}{12}$ $\frac{68}{12} - \frac{33}{12}$ or $4\frac{20}{12} - 2\frac{9}{12}$ $\frac{35}{12} = 2\frac{11}{12}$ Alt: $3(+)(\frac{5}{3} - \frac{3}{4})$ $3(+)(\frac{20}{12} - \frac{9}{12})$ $3 - \frac{1}{2} = 2\frac{11}{12}$ Alt: $4\frac{5}{4}(-)2\frac{3}{4}$ $2(+)(\frac{5}{3} - \frac{3}{4})$ $2(+)(\frac{20}{12} - \frac{9}{12})$ $= 2\frac{11}{12}$	3	M1 M1 A1 -M1 M1 A1 M1 M1 A1	Sight of $\frac{17}{3}$ and $\frac{11}{4}$ or $5\frac{8}{12}$ and $2\frac{9}{12}$ or $\frac{68n}{12n} - \frac{33n}{12n}$ Dep on M2 Dep on M2 Dep on M2 Dep on M2
Total 3 marks					

International GCSE Maths				
Apart from questions 2, 6, 10, 13a, 18ai (where the mark scheme states otherwise) the correct answer, unless clearly obtained by an incorrect method, should be taken to imply a correct method				
Q	Working	Answer	Mark	Notes
1	e.g. $36 \div (2 + 6) (= 4.5)$ or $36 \div \frac{2+6}{3+2+6} (= 49.5)$ oe or Asha = £9 OR Julie = £27			M1
	e.g. $3 \times "4.5"$ or $"49.5" \times \frac{3}{3+2+6}$ or $"9" \times \frac{3}{2}$ or $"27" \times \frac{3}{6}$			M1 or an answer of $\frac{27}{2}$
		13.5(0)	3	A1 SCB1 for $36/5 \times 6 (=43.2)$ or $36/9 \times 2 (=8)$
Total 3 marks				

2	e.g. $\frac{16}{5}$ and $\frac{21}{8}$ oe			M1 both fractions expressed as improper fractions
	e.g. $\frac{16^2}{5} \times \frac{21}{8^1}$ OR $\frac{336}{40}$ oe			M1 correct cancelling OR multiplication of numerators and denominators without cancelling
	e.g. $\frac{16}{5} \times \frac{21}{8} = \frac{336}{40} = \frac{42}{5} = 8\frac{2}{5}$ or $\frac{16}{5} \times \frac{21}{8} = \frac{336}{40} = 8\frac{16}{40} = 8\frac{2}{5}$ or $\frac{16^2}{5} \times \frac{21}{8^1} = \frac{42}{5} = 8\frac{2}{5}$ or candidate clearly shows that in the question, the result of $8\frac{2}{5} = \frac{42}{5}$ and that their answer becomes $\frac{42}{5}$	shown	3	A1 Dep on M2 for conclusion to $8\frac{2}{5}$ from correct working – either sight of the result of the multiplication e.g. $\frac{336}{40}$ must be seen or correct cancelling prior to the multiplication to $\frac{42}{5}$ NB: use of decimals scores no marks
Total 3 marks				



3	$\frac{14}{3}(+)\frac{19}{5}$ or $(4)\frac{10}{15}(+)(3)\frac{12}{15}$ or $(4)\frac{10a}{15a}(+)(3)\frac{12a}{15a}$		3	M1 for correct improper fractions or fractional part of numbers written correctly over a common denominator
	eg $\frac{14 \times 5 + 19 \times 3}{3 \times 5}$ or $\frac{70}{15} + \frac{57}{15}$ or $\frac{70a}{15a} + \frac{57a}{15a}$ or $4\frac{10}{15} + 3\frac{12}{15} = 7\frac{22}{15}$ oe			M1 for correct fractions with a common denominator of 15 or a multiple of 15
	$\frac{70}{15} + \frac{57}{15} = \frac{127}{15} = 8\frac{7}{15}$ or $7\frac{22}{15} = 8\frac{7}{15}$ or if shows $8\frac{7}{15} = \frac{127}{15}$ at the beginning then show that the addition comes to $\frac{127}{15}$	Shown		A1 dep on M2 for a correct answer from fully correct working or shows that $RHS = \frac{127}{15}$ and fully correct working shows $LHS = \frac{127}{15}$
Total 3 marks				



International GCSE Maths A (4MA1) November 2020 – Paper 1HR Mark scheme				
Apart from Questions 1, 3c, 12, 13b, 19, 23 where the mark scheme states otherwise, the correct answer, unless clearly obtained by an incorrect method, should be taken to imply a correct method.				
Q	Working	Answer	Mark	Notes
1	e.g. $\frac{15}{4}$		3	M1 for $3\frac{3}{4}$ expressed as an improper fraction
	e.g. $\frac{15}{4} \times \frac{7}{9} = \frac{105}{36}$ or $\frac{105}{36}$ oe			M1 correct cancelling or multiplication of numerators and denominators without cancelling
	e.g. $\frac{15}{4} \times \frac{7}{9} = \frac{35}{12} = 2\frac{11}{12}$ or $\frac{15}{4} \times \frac{7}{9} = \frac{105}{36} = \frac{35}{12} = 2\frac{11}{12}$ or $\frac{15}{4} \times \frac{7}{9} = \frac{105}{36} = 2\frac{33}{36} = 2\frac{11}{12}$	shown		A1 dep on M2, for conclusion to $2\frac{11}{12}$ from correct working – either sight of the result of the multiplication e.g. $\frac{105}{36}$ oe must be seen or correct cancelling prior to the multiplication to $\frac{35}{12}$ NB: use of decimals scores no marks
				Total 3 marks
2			2	M1 Arcs on BC, AB and arcs from these points meeting or for bisector without arcs
		Correct bisector		A1 must see correct arcs
				Total 2 marks

International GCSE Maths				
Apart from questions 1, 8, 10, 11d, 12c, 14, 15ab, 17 (where the mark scheme states otherwise) the correct answer, unless clearly obtained by an incorrect method, should be taken to imply a correct method				
Question	Working	Answer	Mark	Notes
1	e.g. $\frac{16}{5}$ and $\frac{11}{6}$ or $\frac{96}{30}$ and $\frac{55}{30}$		3	M1 for two correct improper fractions
	e.g. $\frac{16^8}{5} \times \frac{11}{6^3}$ or $\frac{176}{30}$ or $\frac{5280}{900}$ oe			M1 correct cancelling or multiplication of numerators and denominators without cancelling
	e.g. $\frac{16}{5} \times \frac{11}{6} = \frac{176}{30} = \frac{88}{15} = 5\frac{13}{15}$ or $\frac{16}{5} \times \frac{11}{6} = \frac{176}{30} = 5\frac{26}{30} = 5\frac{13}{15}$ or $\frac{16^8}{5} \times \frac{11}{6^3} = \frac{88}{15} = 5\frac{13}{15}$ or $\frac{96}{30} \times \frac{55}{30} = \frac{5280}{900} = \frac{88}{15} = 5\frac{13}{15}$ NB: a student can show initially that $5\frac{13}{15} = \frac{88}{15}$ and they need to show that LHS = $\frac{88}{15}$	shown		A1 Dep on M2 for conclusion to $5\frac{13}{15}$ from correct working – either sight of the result of the multiplication e.g. $\frac{176}{30}$ must be seen and equated to $\frac{88}{15}$ or $5\frac{26}{30}$ or correct cancelling prior to the multiplication to $\frac{88}{15}$ NB: use of decimals scores no marks
				Total 3 marks

10		eg $\frac{4}{5} \times \frac{3}{7} (= \frac{12}{35})$ oe or $0.24 \times \frac{4}{7} (= \frac{96}{700})$ oe or eg $\frac{4}{5} \times 3 (= \frac{12}{5} = 2.4)$ and $0.24 \times 4 (= \frac{24}{25} = 0.96)$ (or 3.36) or eg $\frac{4}{5} \times 300 (= 240)$ and $0.24 \times 400 (= 96)$ (or 336)	$\frac{12}{25}$	3	M1
		eg " $\frac{12}{35}$ " + " $\frac{96}{700}$ " $(= \frac{336}{700})$ oe or " 2.4 " + " 0.96 " $(= \frac{3.36}{7})$ oe or eg " 240 " + " 96 " $(= \frac{336}{700})$ oe			M1 or 0.48 or 48% or correct unsimplified fraction eg $\frac{84}{175}$
					A1 cao
					Total 3 marks



Question	Working	Answer	Mark	Notes
2	eg $\frac{18}{7}$ and $\frac{9}{8}$ oe		3	M1 both fractions expressed as improper fractions, no need for $\div$ or $\times$ may be equivalent to those given eg $\frac{36}{14}$ or $\frac{27}{24}$ etc. A student could invert $\frac{9}{8}$ and show multiplication - as shown in the 2nd M1, this mark is then implied.
	eg $\frac{18}{7} \times \frac{8}{9}$ oe or oe $\frac{144}{56} \div \frac{63}{56}$			M1 or for both fractions expressed as equivalent fractions with denominators that are a common multiple of 7 and 8 eg $\frac{144}{56} \div \frac{63}{56}$
	eg $\frac{18}{7} \times \frac{8}{9} = \frac{144}{63} = \frac{16}{7} = 2\frac{2}{7}$ or $\frac{18}{7} \times \frac{8}{9} = \frac{144}{63} = 2\frac{18}{63} = 2\frac{2}{7}$ or $\frac{18^2}{7} \times \frac{8}{9^2} = \frac{16}{7} = 2\frac{2}{7}$ or $\frac{18}{7} \div \frac{9}{8} = \frac{144}{56} \div \frac{63}{56} = \frac{144}{63} = \frac{16}{7} = 2\frac{2}{7}$ or correct working to $\frac{16}{7}$ and writing $2\frac{2}{7} = \frac{16}{7}$	shown		A1 Dep on M2 for conclusion to $2\frac{2}{7}$ from correct working – either sight of the result of the multiplication or division eg $\frac{144}{63}$ must be seen and then cancelled or correct cancelling prior to the multiplication to $\frac{16}{7}$ or writing $2\frac{2}{7} = \frac{16}{7}$ (maybe on first line of working) and correct working as far as LHS = $\frac{16}{7}$ NB: use of decimals scores no marks
				Total 3 marks



International GCSE Maths				
Apart from questions 2, 7, 10, 11, 17, 18, 21b and 26 the correct answer, unless clearly obtained by an incorrect method, should be taken to imply a correct method				
Q	Working	Answer	Mark	Notes
1 (a)	$2y - 4y + 8 - y^2$		2	M1 for 3 correct terms or for 4 correct terms ignoring signs or ... $-2y - y^2$ or $8 - 2y - \dots$
		$8 - 2y - y^2$		A1 Any order but simplified
(b)		$5b^3c(3b^2 - 7c^8)$	2	B2 fully correct or B1 for a correct partial factorisation with at least two terms outside the bracket eg $5b^3(3b^2c - 7c^8)$ or $5c(3b^5 - 7b^3c^8)$ etc or the fully correct factor outside the bracket with a two term expression in terms of b and c inside the bracket eg $5b^3c(15b^2 - c^8)$
			Total 4 marks	



2	eg $\frac{27}{4}$ and $\frac{18}{7}$		3	M1 Both fractions expressed as improper fractions.
	$\frac{27}{4} \times \frac{7}{18}$ oe or eg $\frac{189}{28} \div \frac{72}{28}$			M1 Invert 2 nd fraction or for both fractions expressed as equivalent fractions with denominators that are a common multiple of 4 and 7 (seeing this stage gains M2)
	eg $\frac{27}{4} \times \frac{7}{18} = \frac{189}{72} = \frac{21}{8} = 2\frac{5}{8}$ or $\frac{27}{4} \times \frac{7}{18} = \frac{189}{72} = 2\frac{45}{72} = 2\frac{5}{8}$ or $\frac{27^3}{4} \times \frac{7}{18^2} = \frac{21}{8} = 2\frac{5}{8}$ or $\frac{189}{28} \div \frac{72}{28} = \frac{189}{72} = 2\frac{45}{72} = 2\frac{5}{8}$ oe if the student clearly shows $2\frac{5}{8} = \frac{21}{8}$ then they only need to complete the LHS to $\frac{21}{8}$ (often done in 1 st line of working)	shown		A1 dep M2 conclusion to $2\frac{5}{8}$ from correct working – either sight of the result of the multiplication e.g. $\frac{189}{72}$ must be seen then cancelled or correct cancelling prior to the multiplication with $\frac{21}{8}$ seen. NB entire solution using decimals scores no marks.
Total 3 marks				



5	(a)		$3c^4 + 12c^3$	2	B2 for $3c^4 + 12c^3$ (B1 for $3c^4$ or $12c^3$)
	(b)(i)			2	M1 for $(x \pm 9)(x \pm 1)$ or for $(x + a)(x + b)$ with $ab = -9$ or $a + b = 8$
			$(x + 9)(x - 1)$		A1 for correct factors
	(ii)		$-9, 1$	1	B1 ft dep on factorising in the form $(x + p)(x + q)$
Total 5 marks					

6		$\frac{8}{3}(+)\frac{15}{4}$ or $(2)\frac{8}{12}(+)(3)\frac{9}{12}$ or $(2)\frac{8a}{12a}(+)(3)\frac{9a}{12a}$		3	M1 for correct improper fractions or fractional part of numbers written correctly over a common denominator
		eg $\frac{8 \times 4 + 15 \times 3}{3 \times 4}$ or $\frac{32}{12} + \frac{45}{12}$ or $\frac{32a}{12a} + \frac{45a}{12a}$ or $2\frac{8}{12} + 3\frac{9}{12} = 5\frac{17}{12}$ oe			M1 for correct fractions with a common denominator of 12 or a multiple of 12
		$\frac{32}{12} + \frac{45}{12} = \frac{77}{12} = 6\frac{5}{12}$ or $5\frac{17}{12} = 6\frac{5}{12}$ or if shows $6\frac{5}{12} = \frac{77}{12}$ at the beginning then show that the addition comes to $\frac{77}{12}$	Shown		A1 dep on M2 for a correct answer from fully correct working or shows that $RHS = \frac{77}{12}$ and fully correct working shows $LHS = \frac{77}{12}$
Total 3 marks					



4	$\frac{16}{3}(-)\frac{20}{7}$ or $(5)\frac{7}{21}(-)(2)\frac{18}{21}$		3	M1 for correct improper fractions or fractional part of numbers written correctly over a common denominator (no need for minus sign)
	$\frac{112}{21} - \frac{60}{21}$ or $5\frac{7}{21} - 2\frac{18}{21} = 3 - \frac{11}{21}$ oe or $5\frac{7}{21} - 2\frac{18}{21} = 4\frac{28}{21} - 2\frac{18}{21}$			M1 for correct fractions with a common denominator with minus sign or mixed numbers to the stage shown
	$\frac{112}{21} - \frac{60}{21} = \frac{52}{21} = 2\frac{10}{21}$ oe or $3 - \frac{11}{21} = 2\frac{10}{21}$ or $5\frac{7}{21} - 2\frac{18}{21} = 4\frac{28}{21} - 2\frac{18}{21} = 2\frac{10}{21}$	Shown		A1 Dep on M2 for a correct answer from fully correct working If all 3 fractions turned into improper fractions on the first line $\frac{16}{3} - \frac{20}{7} = \frac{52}{21}$ then the student clearly needs to show that the LHS $= \frac{52}{21}$
				Total 3 marks



International GCSE Maths				
Apart from questions where the mark scheme states otherwise, the correct answer, unless clearly obtained from an incorrect method, should be taken to imply a correct method.				
Question	Working	Answer	Mark	Notes
1	$\frac{26}{7}, \frac{13}{8}$ oe		3	M1 both fractions expressed as improper fractions, no need for $\div$ or $\times$ may be equivalent to those given eg $\frac{52}{14}, \frac{26}{16}$ etc. A student could invert $\frac{13}{8}$ and show multiplication - as shown in the 2nd M1, this mark is then implied.
	$\frac{26}{7} \times \frac{8}{13}$ oe or eg $\frac{208}{56} \div \frac{91}{56}$			M1 or for both fractions expressed as equivalent fractions with denominators that are a common multiple of 7 and 8 eg $\frac{208}{56} \div \frac{91}{56}$
	eg $\frac{26}{7} \times \frac{8}{13} = \frac{208}{91} = \frac{16}{7} = 2\frac{2}{7}$ or $\frac{26}{7} \times \frac{8}{13} = \frac{208}{91} = 2\frac{26}{91} = 2\frac{2}{7}$ or $\frac{26^2}{7} \times \frac{8}{13} = \frac{16}{7} = 2\frac{2}{7}$ or $\frac{208}{56} \div \frac{91}{56} = \frac{208}{91} = \frac{16}{7} = 2\frac{2}{7}$ or correct working to $\frac{16}{7}$ and writing $2\frac{2}{7} = \frac{16}{7}$ (usually on the first line of working) working required	shown		A1 dep on M2 NB: use of decimals scores no marks (unless used as a check)
				Total 3 marks



International GCSE Maths				
Apart from Questions 1, 11, 15a, 19, 21, 22 the correct answer, unless clearly obtained by an incorrect method, should be taken to imply a correct method				
Q	Working	Answer	Mark	Notes
1	eg $\frac{14}{3}$ and $\frac{11}{6}$		3	M1 for both mixed numbers expressed as improper fractions
	eg $\frac{14}{3} \times \frac{6}{11}$ or $\frac{28}{6} \div \frac{11}{6}$ or $\frac{28n}{6n} \div \frac{11n}{6n}$			M1 seeing this stage gains M2
	eg $\frac{14}{3} \times \frac{6}{11} = \frac{84}{33} = \frac{28}{11} = 2\frac{6}{11}$ or $\frac{14}{3} \times \frac{6}{11} = \frac{84}{33} = 2\frac{18}{33} = 2\frac{6}{11}$ or $\frac{14}{3} \times \frac{6^2}{11} = \frac{28}{11} = 2\frac{6}{11}$ or $\frac{14}{3} \div \frac{11}{6} = \frac{28}{6} \div \frac{11}{6} = \frac{28}{11} = 2\frac{6}{11}$ or correct working to $\frac{28}{11}$ and writing $2\frac{6}{11} = \frac{28}{11}$ Working required	Shown		A1 dep on M2 for conclusion to $2\frac{6}{11}$ from correct working – either sight of result of multiplication eg $\frac{84}{33}$ must be seen or correct cancelling to $\frac{28}{11}$ or complete method using division and common denominators
				Total 3 marks



International GCSE Maths				
Apart from questions 1, 15c, 21, 23, 25 the correct answer, unless clearly obtained by an incorrect method, should be taken to imply a correct method				
Q	Working	Answer	Mark	Notes
1	eg $\frac{14}{3}$ and $\frac{6}{5}$		3	M1 both fractions expressed as correct improper fractions, no need for $\div$ or $\times$ may be equivalent to those given eg $\frac{70}{15}$ or $\frac{18}{15}$ etc. A student could invert $\frac{6}{5}$ and go straight to the 2nd M1, this mark is then implied.
	$\frac{14}{3} \times \frac{5}{6}$ oe $\frac{70}{15} \div \frac{18}{15}$			M1 For inverting 2 nd fraction and showing intention to multiply or for both fractions expressed as correct equivalent fractions with the same denominator with intention to divide eg $\frac{70}{15} \div \frac{18}{15}$
	eg $\frac{14}{3} \times \frac{5}{6} = \frac{70}{18} = \frac{35}{9} = 3\frac{8}{9}$ or $\frac{14}{3} \times \frac{5}{6} = \frac{70}{18} = 3\frac{16}{18} = 3\frac{8}{9}$ or $\frac{14}{3} \times \frac{5}{6} = \frac{35}{9} = 3\frac{8}{9}$ or $\frac{14}{3} \div \frac{6}{5} = \frac{70}{15} = \frac{70}{15} = \frac{35}{9} = 3\frac{8}{9}$ or correct working to $\frac{35}{9}$ and writing $3\frac{8}{9} = \frac{35}{9}$ (maybe earlier in working) <i>working required</i>	Shown		A1 Dep on M2 for conclusion to $3\frac{8}{9}$ from correct working – either sight of the result of the multiplication or division e.g. $\frac{70}{18}$ must be seen or correct cancelling prior to the multiplication to $\frac{35}{9}$ OR writing $3\frac{8}{9} = \frac{35}{9}$ (maybe on first line of working) and correct working as far as LHS = $\frac{35}{9}$ NB: marks are awarded for use of fractions not decimals (but allow a decimal check of answer)
				Total 3 marks



Question	Working	Answer	Mark	Notes
4 (a)	$2x + 5 = 6(2x - 5)$ or $2x + 5 = 12x - 30$ or $\frac{2}{6}x + \frac{5}{6} = 2x - 5$ oe (allow $0.33x + 0.83 = 2x - 5$)		3	M1 For multiplying both sides by 6 or separating values in fraction correctly in an equation. (decimals 2 dp or better)
	$2x - 12x = -30 - 5$ or $-10x = -35$ or $5 + 30 = 12x - 2x$ or $35 = 10x$ oe or $\frac{5}{6} + 5 = 2x - \frac{1}{3}x$ oe or $1\frac{2}{3}x = 5\frac{5}{6}$ oe			M1 ft For collecting the terms in x on one side and the number terms on the other side. ft from incorrect expansion dep on a number term and a term in x on both sides.
	Working required	3.5		A1 dep on M1 oe eg $\frac{7}{2}$ or $3\frac{1}{2}$
(b)		h^{12}	1	B1 Allow x^{12} or another letter to the power 12 but do not allow just 12
(c)	Working not required, so correct answer scores full marks (unless from obvious incorrect working)	$16g^{12}k^{30}$	2	B2 B1 for 2 terms correct in a product [must be 16 and not 2^4]
(d)	eg $\frac{y^n}{y^2} = y^{12}$ or $y^{-2} \times y^n = y^{12}$ or $y^5 \times y^{n-7} = y^{12}$ or $\frac{y^{5+n}}{y^7} = y^{12}$ $y^5 \times y^n = y^{19}$ or $y^{5+n-7} = y^{12}$ or $\frac{y^5}{y^{7-n}} = y^{12}$ or $y^{5+n} = y^{12+7}$ or $5 + n - 7 = 12$ oe		2	M1 for one correct application of an index rule (must be seen in powers of y) this could be after an initial mistake – working will need to be clearly seen or for a correct equation in n (no mistakes allowed)
	Working not required, so correct answer scores full marks (unless from obvious incorrect working)	14		A1 Allow y^{14}
				Total 8 marks



Question	Working	Answer	Mark	Notes
5	eg (one share of the ratio =) $120 \div 2 (= 60)$ or $120 \times \frac{3}{2} (= 180)$ or 180 (g)[butter] or 180 : 120 or for writing the 3 parts of the ratio correctly eg 18 : 15 : 10 (or 18 : 15 and 15 : 10 or S : F = 18 : 10) oe eg 3.6 : 3 : 2		3	M1 For finding the value of one share or For a fully correct calculation for amount of butter or stating 180 (g) butter – may be shown in a ratio – does not need to be labelled if it is clear that the number or calculation refers to the amount of butter
	$(3 \times "60" \div 5) \times 6$ oe or $\frac{f}{"180"} = \frac{6}{5}$ or $\frac{18}{10} \times 120$ oe eg or $\frac{120}{10} \times 18$ oe or $\frac{3.6}{2} \times 120$ oe			M1 For a correct calculation to find the amount of flour Avril uses or a correct equation involving flour that if rearranged correctly would give the correct answer (award the M2 for 216 : 180 : 120 not labelled)
	Working not required, so correct answer scores full marks (unless from obvious incorrect working)	216		A1 or flour = 216 or eg s = 120, b = 180, f = 216 (but flour must be clearly labelled)
Total 3 marks				

Question	Working	Answer	Mark	Notes
6	eg $\frac{24}{7}$ and $\frac{8}{3}$		3	M1 for both mixed numbers expressed as improper fractions
	eg $\frac{24}{7} \times \frac{3}{8}$ oe or $\frac{72}{21} \div \frac{56}{21}$ oe			M1 (assumes previous M1) for inverting the 2 nd fraction and showing intention to multiply or writing both fractions correctly over the same common denominator with division
	eg $\frac{24}{7} \times \frac{3}{8} = \frac{72}{56} = \frac{9}{7} = 1\frac{2}{7}$ or $\frac{24}{7} \times \frac{3}{8} = \frac{72}{56} = 1\frac{16}{56} = 1\frac{2}{7}$ or $\frac{24^3}{7} \times \frac{3}{8^1} = \frac{9}{7} = 1\frac{2}{7}$ or $\frac{24}{7} \div \frac{8}{3} = \frac{72}{21} \div \frac{56}{21} = \frac{72}{56} = \frac{9}{7} = 1\frac{2}{7}$ or correct working to $\frac{9}{7}$ and writing $1\frac{2}{7} = \frac{9}{7}$ (possibly in first line of working)	Shown		A1 dep on M2 for conclusion to $1\frac{2}{7}$ from correct working – either sight of result of multiplication eg $\frac{72}{56}$ must be seen or correct cancelling to $\frac{9}{7}$ or complete method using division and common denominators Note: do not award the use of decimals any marks, but allow this as a check of work in fractions.
				Total 3 marks

4	$\frac{7}{3}$ and $\frac{21}{4}$		3	M1 may have $\frac{4}{21}$ rather than $\frac{21}{4}$
	$\frac{7}{3} \times \frac{4}{21}$ oe eg $\frac{49}{21} \times \frac{4}{21}$ or $\frac{28}{12} \div \frac{63}{12}$ oe			M1 for intention to multiply correct improper fraction and inverted fraction or writing the 2 fractions over the same common denominator
	eg $\frac{7}{3} \times \frac{4}{21} = \frac{28}{63} = \frac{4}{9}$ oe eg $\frac{49}{21} \times \frac{4}{21} = \frac{196}{441} = \frac{4}{9}$ or $\frac{7}{3} \times \frac{4}{21} = \frac{4}{9}$ oe or $\frac{28}{12} \div \frac{63}{12} = \frac{28}{63} = \frac{4}{9}$ Working required	Correctly shown		A1 for correctly completing to reach the required answer Ignore any decimals used as checking.
				Total 3 marks



4	$\frac{18}{7}, \frac{28}{9}$		3	M1 for correct improper fractions
	$\frac{18^2}{7^1} \times \frac{28^4}{9^1}$ or $\frac{18}{7} \times \frac{28}{9} = \frac{504}{63}$ oe eg $\frac{18^2}{7} \times \frac{28}{9^1} = \frac{56}{7}$ or $\left(\frac{18}{7} \times \frac{28}{9} = \right) \frac{162}{63} \times \frac{196}{63} = \frac{31752}{3969}$ oe			M1dep for cancelling fractions fully or cancelling fractions partially and clear intention to multiply (allow arithmetic error in multiplication) or not cancelling and clear intention to multiply (allow arithmetic error in multiplication)
	eg $\frac{18^2}{7^1} \times \frac{28^4}{9^1} = 8$ or $\frac{18^2}{7^1} \times \frac{28^4}{9^1} = 2 \times 4 = 8$ eg $\frac{18}{7} \times \frac{28}{9} = \frac{504}{63} = 8$ oe or eg $\left(\frac{18}{7} \times \frac{28}{9} = \right) \frac{162}{63} \times \frac{196}{63} = \frac{31752}{3969} \left(= \frac{8}{1} \right) = 8$ <i>working required</i>	Shown		A1 Dep on M2 for a correct answer of 8 from fully correct working Candidates may show $8 = \frac{8}{1}$ (maybe under the given 8) and then they need only show the given fraction comes to $\frac{8}{1}$
Total 3 marks				



International GCSE Maths				
Figures in inverted commas must come from a correct method previously seen unless otherwise stated.				
Q	Working	Answer	Mark	Notes
1	$\frac{12}{7} \times \frac{35}{16}$ oe		3	M1 for both fractions written as improper fractions
	$\frac{12}{7} \times \frac{35}{16} = \frac{420}{112}$ oe eg $\frac{192}{112} \times \frac{245}{112} = \frac{47040}{12544}$ or $\frac{\cancel{12}^3}{7^1} \times \frac{\cancel{35}^5}{\cancel{16}^4}$ oe or eg $\frac{12}{7^1} \times \frac{\cancel{35}^5}{16} = \frac{60}{16}$ oe			M1 for multiplying the numerators and multiplying the denominators or cancelling the fractions fully or cancelling fractions partially and multiplying across
	$\frac{12}{7} \times \frac{35}{16} = \frac{420}{112} = \frac{15}{4} = 3\frac{3}{4}$ oe or $\frac{12}{7} \times \frac{35}{16} = \frac{420}{112} = 3\frac{84}{112} = 3\frac{3}{4}$ oe $\frac{\cancel{12}^3}{7^1} \times \frac{\cancel{35}^5}{\cancel{16}^4} = \frac{15}{4} = 3\frac{3}{4}$ oe <i>Working required</i>	shown		A1 completion to given result. dep on M2 If a student shows clearly in their working that $3\frac{3}{4} = \frac{15}{4}$ they only need to show that the LHS comes to $\frac{15}{4}$
				Total 3 marks

3	eg $\frac{9}{4}$ and $\frac{12}{7}$		3	M1 for $2\frac{1}{4}$ and $1\frac{5}{7}$ expressed as improper fractions
	eg $\frac{9}{4} \times \frac{12^3}{7}$ OR $\frac{9}{4} \times \frac{12}{7} = \frac{108}{28}$ oe eg $\frac{63}{28} \times \frac{48}{28} = \frac{3024}{784}$			M1 correct cancelling or multiplication of numerators and denominators without cancelling
	eg $\frac{9}{4} \times \frac{12^3}{7} = \frac{27}{7} = 3\frac{6}{7}$ or $\frac{9}{4} \times \frac{12}{7} = \frac{108}{28} = \frac{27}{7} = 3\frac{6}{7}$ or $\frac{9}{4} \times \frac{12}{7} = \frac{108}{28} = 3\frac{24}{28} = 3\frac{6}{7}$ or $\frac{9}{4} \times \frac{12}{7} = \frac{63}{28} \times \frac{48}{28} = \frac{3024}{784} = \frac{27}{7} = 3\frac{6}{7}$ or $\frac{9}{4} \times \frac{12}{7} = \frac{63}{28} \times \frac{48}{28} = \frac{3024}{784} = 3\frac{672}{784} = 3\frac{6}{7}$ or correct working to $\frac{27}{7}$ and writing $3\frac{6}{7} = \frac{27}{7}$ <i>Working required</i>	shown		A1 dep on M2, for conclusion to $3\frac{6}{7}$ from correct working – either sight of the result of the multiplication e.g. $\frac{108}{28}$ oe must be seen or correct cancelling prior to the multiplication to $\frac{27}{7}$ NB: use of decimals scores no marks unless as a check
Total 3 marks				



Question	Working	Answer	Mark	Notes
3	$\frac{22}{3}(-)\frac{25}{7}$ or $(7)\frac{7}{21}(-)(3)\frac{12}{21}$ or $(7)\frac{7a}{21a}(-)(3)\frac{12a}{21a}$		3	M1 for correct improper fractions or fractional part of numbers written correctly over a common denominator
	$\frac{154}{21} - \frac{75}{21}$ or $\frac{22 \times 7}{21} - \frac{25 \times 3}{21}$ or $\frac{22 \times 7 - 25 \times 3}{21}$ $\frac{154a}{21a} - \frac{75a}{21a}$ or $7\frac{7}{21} - 3\frac{12}{21} = 4 - \frac{5}{21}$ oe or $7\frac{7}{21} - 3\frac{12}{21} = 6\frac{28}{21} - 3\frac{12}{21}$			M1 for correct fractions with a common denominator with minus sign or mixed numbers to the stage shown $\frac{154}{21} - \frac{75}{21}$ or $\frac{22 \times 7}{21} - \frac{25 \times 3}{21}$ implies the first M1
	$\frac{154}{21} - \frac{75}{21} = \frac{79}{21} = 3\frac{16}{21}$ or $4 - \frac{5}{21} = 3\frac{16}{21}$ or $7\frac{7}{21} - 3\frac{12}{21} = 6\frac{28}{21} - 3\frac{12}{21} = 3\frac{16}{21}$ <i>Working required</i>	A fully correct solution shown		A1 Dep on M2 for a correct answer from fully correct working If a student shows that $3\frac{16}{21} = \frac{79}{21}$ then they must show correct working to $\frac{79}{21}$ and can gain full marks for this
Total 3 marks				

13	$\frac{1}{3} + \frac{1}{5} (= \frac{8}{15})$ or 0.53... or 53.3....% or 53%	900	4	M1
	$1 - \frac{8}{15}$ (= $\frac{7}{15}$) or 0.46.... or 0.47 or 46.6...% or 47%			M1
	$420 \div \frac{7}{15}$ (= 900) oe			M1
				A1
				Total 4 marks

14	(a)		$8e^6 f^9$	2	B2 B1 for 2 correct terms in a product of 3 terms
	(b)	$3x^2 + 9xy - 4yx - 12y^2$	$3x^2 + 5xy - 12y^2$	2	M1 M1 for 3 correct terms out of 4 or for 4 correct terms ignoring signs or for $3x^2 + 5xy + c$ for any non zero value of c or for $d + 5xy - 12y^2$ for any non zero value of d
					A1
	(c)	$a^{\frac{1}{2}} \times a = a^{\frac{3}{2}}$ or $\frac{a}{a^{-2}} = a^3$ or $\frac{a^{\frac{1}{2}}}{a^{-2}} = a^{\frac{5}{2}}$	$\frac{7}{2}$	2	M1 for one correct step
					A1 oe
	(d)	$\frac{2^n - 1}{(2^n - 1)(2^n + 1)}$	$\frac{1}{2^n + 1}$	2	M1 for $(2^n - 1)(2^n + 1)$
					A1
					Total 8 marks

Question	Working	Answer	Mark	Notes
2	$\frac{3}{4} \times 60 (= 45)$ or $\frac{1}{4} \times 60 (= 15)$ OR $\frac{3}{4} \times \frac{3}{5} \left(= \frac{9}{20} \right)$ $\frac{3}{5} \times "45" (= 27)$ or $\frac{4}{5} \times "15" (= 12)$ OR $\frac{1}{4} \times \frac{4}{5} \left(= \frac{4}{20} \right)$ $\frac{"27" + "12"}{60}$ OR $\frac{9}{20} + \frac{4}{20}$	$\frac{13}{20}$	4	M1 M1 M1 For a complete method A1 oe
3	$14^2 - 10^2 (= 96)$ $"96" + 5^2 (= 121)$ $\sqrt{"121"}$	11	4	M1 M1 M1 A1
4	$(a =) 40 - 14 (= 26)$ e.g. $\frac{"26" + b}{2} = 30$ or $30 + (30 - "26")$	$\frac{26}{34}$	3	M1 Method to find a M1 Method to find b A1

International GCSE Maths					
Apart from questions 5(b), 15, 17, 18, 19, 23 and 24 (where the mark scheme states otherwise) the correct answer, unless clearly obtained by an incorrect method, should be taken to imply a correct method					
Q	Working	Answer	Mark	Notes	
1	e.g. $0.7 \times 20\,160$ oe (= 14 112) or $0.3 \times 20\,160$ oe (= 6048)		4	M1	
	e.g. “14 112” $\div (9 + 5 + 2)$ (= 882) or $(20\,160 - “6048”) \div (9 + 5 + 2)$ (= 882)			M1	M2 for $\frac{9-2}{9+5+2} \times “14\,112”$ oe
	e.g. $9 \times “882” - 2 \times “882”$			M1	
		6174		A1	
				Total 4 marks	

13	$\frac{3}{8} + 45\% \left(= \frac{33}{40} \text{ or } 82.5\% \text{ or } 0.825 \right)$		5	M1 Do NOT award M1 for e.g. $\frac{3}{8} + 45(\%) + 406(= \dots) \text{ oe}$
	$1 - \frac{33}{40} \left(= \frac{7}{40} \right) \text{ or } 100 - 82.5(\%) (= 17.5(\%)) \text{ or } 1 - 0.825 (= 0.175)$			M1
	$406 \div \frac{7}{40} (= 2320) \text{ or } 406 \div \frac{17.5}{100} \text{ oe } (= 2320) \text{ or } 1\% = 406 \div 45 (= 23.2) \text{ oe}$			M1
	$0.45 \times 2320 \text{ oe or } 45 \times 23.2 \text{ oe}$			M1
		1044		A1
				Total 5 marks

13 ALT	$\frac{3}{8}x + 0.45x + 406 \text{ oe}$		5	M1 Do NOT award M1 for e.g. $\frac{3}{8} + 45(\%) + 406(= \dots) \text{ oe}$
	$\frac{3}{8}x + 0.45x + 406 = x \text{ oe}$			M1 for a correct equation
	$(x =) \frac{406}{1 - \frac{3}{8} - 0.45} \left(= \frac{406}{\frac{7}{40}} = 2320 \right)$			M1
	0.45×2320			M1
		1044		A1
				Total 5 marks

15		$x = 0.25454...$ $100x = 25.454...$ $10x = 2.5454...$ $1000x = 254.54...$		2	M1 For 2 recurring decimals that when subtracted give a whole number or terminating decimal eg 25.2 or 252 etc eg $100x = 25.454...$ and $x = 0.25454...$ or $1000x = 254.54...$ and $10x = 2.5454...$ with intention to subtract. (if recurring dots not shown then showing at least the digits 25454, ie 5sf) or $0.2 + 0.0\dot{5}4$ and eg $x = 0.05454...$, $100x = 5.4545...$ with intention to subtract.
		eg $100x - x = 25.454... - 0.254... = 25.2$ and $\frac{25.2}{99} = \frac{14}{55}$ or $1000x - 10x = 254.545... - 2.545... = 252$ and $\frac{252}{990} = \frac{14}{55}$ or $100x - x = 5.4545... - 0.05454... = 5.4$ and $\frac{5.4}{99} = \frac{54}{990} \left(= \frac{3}{55} \right)$ and $\frac{2 \times 99 + 54}{990} = \frac{252}{990} = \frac{14}{55}$ or $\frac{5.4}{99} = \frac{54}{990} = \frac{3}{55}$ and $\frac{11 + 3}{55} = \frac{14}{55}$	show		A1 for completion to $\frac{14}{55}$

12	$3^4 = \frac{3^x}{9^{3x}}$ or $81 = \frac{3^x}{(3^2)^{3x}}$	$9^2 = \frac{3^x}{9^{3x}}$ or $81 = \frac{(9^{0.5})^x}{9^{3x}}$			M1 replacing 81 with 3^4 or 9^{3x} with $(3^2)^{3x}$ (or 3^{6x}) or replacing 81 with 9^2 or 3^x with $(9^{0.5})^x$ (in an equation)
	eg $4 + 6x = x$ or $4 = x - 2(3x)$ oe	eg $2 = 0.5x - 3x$ oe			M1 a correct equation using powers
			-0.8	3	A1 oe, dep on at least M1
					Total 3 marks

13	e.g. $x = 0.68\bar{1}$ and $100x = 68.1\bar{8}$ or $10x = 6.8\bar{1}$ and $1000x = 681.8\bar{1}$			M1 e.g. two decimals that when subtracted give a finite decimal (must show understanding of recurring figures by 'dot' or at least 2 lots of 18 or 81 after the decimal point). Algebra required, use of any letter.
	$99x = 67.5, x = \frac{67.5}{99} = \frac{15}{22}$ or $990x = 675, x = \frac{675}{990} = \frac{15}{22}$ oe	show	2	A1 dep for completing the 'show that' arriving at given answer from correct working.
				Total 2 marks

16	eg $10\,000x = 2813.13\dots$ $100x = 28.13\dots$ or $1000x = 281.313\dots$ $10x = 2.813\dots$ or $100x = 28.1313\dots$ $x = 0.2813\dots$ oe		2	M1 For 2 recurring decimals that when subtracted give a whole number or terminating decimal (27.85 or 278.5 or 2785 etc) eg $10\,000x = 2813.13\dots$ and $100x = 28.1313\dots$ or $1000x = 281.313\dots$ and $10x = 2.81313\dots$ or $100x = 28.1313\dots$ and $x = 0.281313\dots$ with intention to subtract. (if recurring dots not shown then showing at least one of the numbers to at least 6sf) or $0.28 + 0.001\dot{3}$ and eg $100x = 0.1313\dots$, $10\,000x = 13.1313\dots$ with intention to subtract.
	eg $10\,000x - 100x = 2813.13\dots - 28.1313\dots = 2785$ and $\frac{2785}{9900} = \frac{557}{1980}$ or $1000x - 10x = 281.313\dots - 2.81313\dots = 278.5$ and $\frac{278.5}{990} = \frac{557}{1980}$ or $100x - x = 28.1313\dots - 0.281313\dots = 27.85$ and $\frac{27.85}{99} = \frac{557}{1980}$ or eg $10\,000x - 100x = 13.1313\dots - 0.1313\dots = 13$ and $0.28 + \frac{13}{9900} = \frac{28 \times 99 + 13}{9900} = \frac{2785}{9900} = \frac{557}{1980}$ oe	shown		A1 for completion to $\frac{557}{1980}$ dep on M1 (NB: this is a “use algebra to show that...” question, so we need to see algebra as well as seeing all the stages of working to award full marks)
Total 2 marks				

17	eg $x = 0.34545\dots$ and $100x = 34.545\dots$ with intention to subtract OR $10x = 3.4545\dots$ and $1000x = 345.45\dots$ with intention to subtract Must include algebra as the question asked for 'using algebra'		2	M1 for 2 recurring decimals (they must identify or show the pair they are using) that when subtracted give a whole number or terminating decimal eg $100x = 34.545\dots$ and $x = 0.34545\dots$ OR $1000x = 345.45\dots$ and $10x = 3.4545\dots$ with intention to subtract. (If recurring dots not shown then showing at least the digits 34545, i.e. 5sf for one of the numbers that they are using) OR $0.3 + 0.0454545\dots$ and Eg $10x = 0.454545\dots$ and $1000x = 45.4545\dots$
	eg $100x - x = 34.545\dots - 0.34545\dots$ and $99x = 34.2$ and $\frac{34.2}{99} = \frac{19}{55}$ oe OR $1000x - 10x = 345.45\dots - 3.4545\dots$ and $990x = 342$ and $\frac{342}{990} = \frac{19}{55}$ oe OR $0.3 + \dots$ and $(1000x - 100x = 990x = 45)$ and $0.3 + \frac{45}{990} = \frac{3 \times 99 + 45}{990} = \frac{19}{55}$ oe	shown		A1 for completion to $\frac{19}{55}$
Total 2 marks				

13	eg $10\,000x = 3818.18\ldots$ $100x = 38.18\ldots$ or $1000x = 381.818\ldots$ $10x = 3.818\ldots$ or $100x = 38.1818\ldots$ $x = 0.3818\ldots$ oe		2	M1 For selecting 2 correct recurring decimals that when subtracted give a whole number or terminating decimal (37.8 or 378 or 3780 etc) eg $10\,000x = 3818.18\ldots$ and $100x = 38.1818\ldots$ or $1000x = 381.818\ldots$ and $10x = 3.81818\ldots$ or $100x = 38.1818\ldots$ and $x = 0.381818\ldots$ with intention to subtract. (if recurring dots not shown then showing at least one of the numbers to at least 5 sf) or $0.38 + 0.0018$ and eg $100x = 0.1818\ldots$, $10000x = 18.1818\ldots$ with intention to subtract.
	eg $10\,000x - 100x = 3818.18\ldots - 38.1818\ldots = 3780$ $(9900x = 3780)$ and $\frac{3780}{9900} = \frac{21}{55}$ or eg $1000x - 10x = 381.818\ldots - 3.81818\ldots = 378$ $(990x = 378)$ and $\frac{378}{990} = \frac{21}{55}$ or eg $100x - x = 38.1818\ldots - 0.381818\ldots = 37.8$ $(99x = 37.8)$ and $\frac{37.8}{99} = \frac{21}{55}$ or eg $10\,000x - 100x = 18.1818\ldots - 0.181818\ldots = 18$ and $0.38 + \frac{18}{9900} = \frac{38 \times 99 + 18}{9900} = \frac{3780}{9900} = \frac{21}{55}$ oe	shown		A1 for completion to $\frac{21}{55}$ dep on M1 <i>(NB: this is a “use algebra to show that...” question, so we need to see algebra as well as seeing all the stages of working to award full marks)</i>
Total 2 marks				

Question	Working	Answer	Mark	Notes
16	eg $1000x = 438.38\dots$ $10x = 4.38\dots$ or $100x = 43.838\dots$ $x = 0.438\dots$ oe		2	M1 For selecting 2 correct recurring decimals that when subtracted give a whole number or terminating decimal (43.4 or 434 etc) eg $1000x = 438.38\dots$ and $10x = 4.38\dots$ or $100x = 43.838\dots$ and $x = 0.438\dots$ with intention to subtract. (if recurring dots not shown then showing at least one of the numbers to at least 5sf) or $0.4 + 0.0\dot{3}8$ and eg $1000x = 38.38\dots$ & $10x = 0.3838\dots$, with intention to subtract.
	eg $1000x - 10x = 438.38\dots - 4.38\dots = 434$ and $\frac{434}{990} = \frac{217}{495}$ or eg $100x - x = 43.838\dots - 0.438\dots = 43.4$ and $\frac{43.4}{99} = \frac{217}{495}$ or eg $1000x - 10x = 38.38\dots - 0.3838 = 38$ and $0.4 + \frac{38}{990} = \frac{4 \times 99 + 38}{990} = \frac{434}{990} = \frac{217}{495}$ oe <i>working required</i>	Clearly shown		A1 For completion to $\frac{217}{495}$ dep on M1 and use of some algebra
Total 2 marks				

16	eg $10\,000x = 1767.67\dots$ $100x = 17.67\dots$ or $1000x = 176.76\dots$ $10x = 1.76\dots$ or $100x = 17.676\dots$ $x = 0.176\dots$ oe		2	M1 for 2 recurring decimals that when subtracted give a whole number or terminating decimal (17.5 or 175 or 1750 etc) eg $10\,000x = 1767.67\dots$ and $100x = 17.676\dots$ or $1000x = 176.76\dots$ and $10x = 1.7676\dots$ or $100x = 17.676\dots$ and $x = 0.17676\dots$ with intention to subtract. (if recurring dots not shown in both numbers then showing at least one of the numbers to at least 5sf) or $0.1 + 0.0\dot{7}6$ and eg $100x = 7.6767\dots$, $x = 0.07676\dots$ with intention to subtract.
	eg $10\,000x - 100x = 1767.67\dots - 17.67\dots = 1750$ and $\frac{1750}{9900} = \frac{35}{198}$ or $1000x - 10x = 176.76\dots - 1.76\dots = 175$ and $\frac{175}{990} = \frac{35}{198}$ or $100x - x = 17.676\dots - 0.176\dots = 17.5$ and $\frac{17.5}{99} = \frac{35}{198}$ or eg $10x - x = 7.6767\dots - 0.07676\dots = 7.6$ and $0.1 + \frac{7.6}{99} = \frac{0.1 \times 99 + 7.6}{99} = \frac{17.5}{99} = \frac{35}{198}$ oe	shown		A1 for completion to $\frac{35}{198}$ dep on M1
Working required				Total 2 marks

18	eg $\begin{array}{r} 1000x = 306.306\dots \\ x = 0.306\dots \end{array}$ OR eg $\begin{array}{r} 1000\,000x = 306\,306(\dots) \\ 1000x = 306.306\dots \end{array}$		2	M1 M1 for two correct algebraic equations involving recurring decimals that when subtracted give a whole number or terminating decimal (306 or 306 000 etc) with intention to subtract. eg $1000x = 306.306\dots$ and $x = 0.306\dots$ or $1000\,000x = 306306(\dots)$ and $1000x = 306.306$ (if recurring dots not shown in both numbers then showing at least one of the numbers to at least 6sf)
	eg $\begin{array}{r} 1000x - x = 306.306\dots - 0.306306\dots = 306 \text{ and} \\ \frac{306}{999} = \frac{34}{111} \end{array}$ or $999x = 306 \text{ and } \frac{306}{999} = \frac{34}{111} \text{ OR}$ eg $1000\,000x - 1000x = 306306(\dots) - 306.306 = 306\,000$ and $\frac{306\,000}{999\,000} = \frac{34}{111}$ or $999\,000x = 306\,000 \text{ and } \frac{306\,000}{999\,000} = \frac{34}{111}$	shown		A1 for completion to $\frac{34}{111}$ dep on M1
	Working required			Total 2 marks



15	eg $(10\,000x =) 7636.36..._$ $(100x =) 76.36..._$ or $(1000x =) 763.63..._$ $(10x =) 7.63..._$ or $(100x =) 76.363..._$ $(x =) 0.763..._$ oe		2	M1 For 2 recurring decimals that when subtracted give a whole number or terminating decimal <u>with intention to subtract</u>. (ie give 75.6 or 756 or 7560 etc) eg $(10\,000x =) 7636.36..._$ and $(100x =) 76.36..._$ or $(1000x =) 763.63..._$ and $(10x =) 7.63..._$ or $(100x =) 76.363..._$ and $(x =) 0.763..._$ with intention to subtract. (if recurring not shown then showing at least one of the numbers to at least 5sf) or $\frac{7}{10} + 1000x(63.6\dot{3}) - 10x(0.\dot{6}3)$
	eg $10\,000x - 100x = 7636.36... - 76.36... = 7560$ and $\frac{7560}{9900} = \frac{42}{55}$ or $1000x - 10x = 763.63... - 7.63... = 756$ $(990x = 756)$ and $\frac{756}{990} = \frac{42}{55}$ or $100x - x = 76.363... - 0.763... = 75.6$ and $\frac{75.6}{99} = \frac{42}{55}$ $(99x = 75.6)$ or $\frac{7}{10} + \frac{63}{990} = \frac{7 \times 99 + 63}{990} = \frac{42}{55}$	shown		A1 for completion to $\frac{42}{55}$ dep on M1 and must use algebra for this final mark to be awarded [allow for instance $99x = 75.6$ and then $\frac{756}{990} = \frac{42}{55}$] No algebra used gets a maximum of 1
	Working required			Total 2 marks

16	(10000x =) 6121.21..._ eg $\frac{(100x=) \quad 61.21...}{\quad}$ (1000x =) 612.12..._ or $\frac{(10x=) \quad 6.12...}{\quad}$ (100x =) 61.212..._ or $\frac{(x=) \quad 0.612...}{\quad}$		2	M1 for 2 recurring decimals that when subtracted give a whole number or terminating decimal with <u>intention to subtract</u>. (ie give 60.6 or 606 or 6060 etc) eg (1000x =) 612.12... and (10x =) 6.12.... or (100 000x =) 61 212.12.... and (1000x =) 612.... or (100x =) 61.212.... and (x =) 0.612.... with intention to subtract x is not required to award this mark (if recurring dots not shown in both numbers then showing at least one of the numbers to at least 5sf) or $\frac{6}{10} + 1000x(12.12) - 10x(0.12)$
	eg $10000x - 100x = 6121.21... - 61.21... = 6060$ ($9900x = 6060$) and $\frac{6060}{9900} = \frac{101}{165}$ or $1000x - 10x = 612.12... - 6.12... = 606$ ($990x = 606$) and $\frac{606}{990} = \frac{101}{165}$ or $100x - x = 61.212... - 0.612... = 60.6$ ($99x = 60.6$) and $\frac{60.6}{99} = \frac{101}{165}$ oe OR $0.6 + ...$ and ($1000x - 100x = 990x = 12$) and $0.6 + \frac{12}{990} = \frac{0.6 \times 990 + 12}{990} = \frac{101}{165}$ oe	shown		A1 for completion to $\frac{101}{165}$ dep on M1 and must use algebra for this final mark to be awarded [allow for instance $99x = 60.6$ and then $\frac{606}{990} = \frac{101}{165}$] No algebra used gets a maximum of 1 mark
	Working required			Total 2 marks

18	$(1000x =) 702.702\dots$ eg $\underline{\hspace{1cm} (x =) \quad 0.702\dots}$ $(10000x =) 7027.02\dots$ or $\underline{\hspace{1cm} (10x =) \quad 7.02\dots}$ $(100000x =) 70270.20\dots$ or $\underline{\hspace{1cm} (100x =) \quad 70.20\dots}$		2	M1 for 2 recurring decimals that when subtracted give a whole number or terminating decimal with <u>intention to subtract</u> . (ie give 702 or 7020 or 70200 etc) eg $(1000x =) 702.702\dots$ and $(x =) 0.702\dots$ or $(10000x =) 7027.02\dots$ and $(10x =) 7.02\dots$ or $(100000x =) 70270.20\dots$ and $(100x =) 70.20\dots$ with intention to subtract x is not required to award this mark (if recurring dots not shown in both numbers then showing at least one of the numbers to at least 6sf) NB Accept bar notation for dot notation to indicate recurring decimals
	eg $1000x - x = 702.70\dots - 0.702\dots = 702$ $(999x = 702)$ and $\frac{702}{999} = \frac{26}{37}$ or $10000x - 10x = 7027.02\dots - 7.02\dots = 7020$ $(9990x = 7020)$ and $\frac{7020}{9990} = \frac{26}{37}$ or $100000x - 100x = 70270.20\dots - 70.20 = 70200$ $(99900x = 70200)$ and $\frac{70200}{99900} = \frac{26}{37}$	shown		A1 for completion to $\frac{26}{37}$ dep on M1 and must use algebra for this final mark to be awarded No algebra used gets a maximum of 1 mark
	Working required			Total 2 marks



18	E.g. $y = 0.4x....$ and $10y = 4x....$ $(10y - y = 4x - 0.4 \text{ oe})$ or $10y = 4x....$ and $100y = 4x.x....$ $(100y - 10y = 4x - 4 \text{ oe})$ or $100y = 4x.x....$ and $1000y = 4xx.x....$ $(1000y - 100y = 4xx - 4x \text{ oe})$		3	M1 for selecting 2 correct recurring decimal expressions and then a demonstration to subtract (If recurring dots not shown then allow each expression to 1 dp e.g. $y = 0.4x....$ and $100y = 4x.x....$ as a pair and $100y - y$ or $4x.x.... - 0.4x....$) or an answer of $y = \frac{4x-4}{90} \text{ oe}$
	E.g. $9y = 4\frac{x}{10} - \frac{4}{10} = \frac{40+x-4}{10} \text{ oe or}$ $90y = 40+x-4 \text{ oe or}$ $900y = 400+10x+x-40-x \text{ oe}$			M1 for a correct subtraction with correct expressions simplified
	Working required	$\frac{36+x}{90}$		A1 dep on M2 oe
				Total 3 marks

13	a	e.g. $x = 0.57272\dots$ and $100x = 57.272\dots$ OR e.g. $10x = 5.7272\dots$ and $1000x = 572.72\dots$			M1 For 2 recurring decimals with correct algebraic labels that when subtracted give a whole number or terminating decimal eg 56.7 or 567 etc e.g. $100x = 57.272\dots$ and $x = 0.57272\dots$ OR $1000x = 572.72\dots$ and $10x = 5.7272\dots$ with intention to subtract. (If recurring dots not shown then showing at least the digits 57272, ie 5sf)
		e.g. $100x - x = 57.272\dots - 0.57272\dots = 56.7$ and $\frac{56.7}{99} = \frac{63}{110}$ or $1000x - 10x = 572.72\dots - 5.7272\dots = 567$ and $\frac{567}{990} = \frac{63}{110}$	Shown	2	A1 for completion to $\frac{63}{110}$
	b	$\frac{3}{2-\sqrt{y}} \times \frac{2+\sqrt{y}}{2+\sqrt{y}}$ or $6+3\sqrt{y}$ or $4-y$			M1 for multiplying numerator and denominator by $(2+\sqrt{y})$ or a correct expression for the numerator or denominator
			$\frac{6+3\sqrt{y}}{4-y}$	2	A1
Total 4 marks					



Question	Working	Answer	Mark	Notes
17 (a)	eg $x = 0.4\dot{3}\dot{6}$ and $100x = 43.\dot{6}\dot{3}$ or $10x = 4.\dot{3}\dot{6}$ and $1000x = 436.\dot{3}\dot{6}$	show	2	M1 eg two decimals that when subtracted give a finite decimal
	$99x = 43.2, x = \frac{43.2}{99}$ or $990x = 432, x = \frac{432}{990}$			A1 for completing the 'show that' arriving at given answer from correct working.
(b)			3	M1 for $\sqrt{20} = 2\sqrt{5}$ and $\sqrt{80} = 4\sqrt{5}$ or $\frac{\sqrt{20} + \sqrt{80}}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}}$ or $\frac{\sqrt{20} + 2\sqrt{20}}{\sqrt{3}}$
				M1dep for $\frac{6\sqrt{15}}{3}$ or $2\sqrt{15}$ or $\frac{3\sqrt{60}}{3}$ oe
		$\sqrt{60}$		A1 dep on M2, accept $a = 60$
Total 5 marks				

15	a	E.g. $x = 4.57\dots$ and $100x = 457.57\dots$ or $10x = 45.757\dots$ and $1000x = 4575.7\dots$ or $x = 0.57\dots$ and $100x = 57.57\dots$ or $10x = 5.757\dots$ and $1000x = 575.7\dots$		2	M1 for selecting 2 recurring decimals that when subtracted give a whole number or terminating decimal eg 453 or 4530 etc eg $100x = 457.57\dots$ and $x = 4.57\dots$ or $1000x = 4575.7\dots$ and $10x = 45.757\dots$ with intention to subtract. (If recurring dots not shown then allow $10x = 45.757$, $100x = 457.57$, and $1000x = 4575.7$ to at least 5sf) or $4 + 0.5757$ and eg $x = 0.57\dots$, $100x = 57.57\dots$ with intention to subtract.
		E.g. $100x - x = 457.57\dots - 4.57\dots = 453$ and $\frac{453}{99} = \frac{151}{33}$ or $4\frac{19}{33}$ or $1000x - 10x = 4575.7\dots - 45.757\dots = 4530$ and $\frac{4530}{990} = \frac{151}{33}$ or $4\frac{19}{33}$ or $100x - x = 57.57\dots - 0.57\dots = 57$ and $\frac{57}{99}$ or $\frac{19}{33}$ (so) $4.\dot{5}\dot{7} = 4\frac{19}{33}$ or $1000x - 10x = 575.7\dots - 5.757\dots = 570$ and $\frac{570}{990}$ or $\frac{57}{99}$ or $\frac{19}{33}$ (so) $4.\dot{5}\dot{7} = 4\frac{19}{33}$	Shown		A1 for completion to $\frac{151}{33}$ or $4\frac{19}{33}$

15	b	E.g. $\frac{2}{6-3\sqrt{2}} \times \frac{6+3\sqrt{2}}{6+3\sqrt{2}} \text{ or } \frac{2}{6-3\sqrt{2}} \times \frac{-6-3\sqrt{2}}{-6-3\sqrt{2}}$		3	M1 for rationalising the denominator by multiplying numerator and denominator by $6+3\sqrt{2}$ (or $-6-3\sqrt{2}$)
		$\frac{12+6\sqrt{2}}{36-18\sqrt{2}+18\sqrt{2}-18} \text{ or } \frac{12+6\sqrt{2}}{18} \text{ or } \frac{12+6\sqrt{2}}{6^2-(3\sqrt{2})^2} \text{ or } \frac{12+6\sqrt{2}}{6^2-9 \times 2}$			M1 (numerator may be expanded or denominator may be 4 terms which need to be all correct)
			$\frac{2+\sqrt{2}}{3}$		A1 or for stating $a = 2$ and $b = 3$ for $\frac{2+\sqrt{2}}{3}$ from correct working dep on M2
					Total 5 marks



15	(a)	eg $x = 0.372\ldots$ and $100x = 37.272\ldots$ or $10x = 3.72\ldots$ and $1000x = 372.72\ldots$		2	M1 For 2 recurring decimals that when subtracted give a whole number or terminating decimal eg $100x = 37.272\ldots$ and $x = 0.372\ldots$ or $1000x = 372.72\ldots$ and $10x = 3.72\ldots$ with intention to subtract. (At least one of the numbers must be shown with recurring dots or to at least 5 sf) or $0.3 + 0.0727\ldots$ and eg $y = 0.072\ldots$, $100y = 7.2727\ldots$ with intention to subtract.
		eg $100x - x = 37.272\ldots - 0.372\ldots = 36.9$ and $\frac{36.9}{99} = \frac{41}{110}$ or $1000x - 10x = 372.72\ldots - 3.72\ldots = 369$ and $\frac{369}{990} = \frac{41}{110}$ or $100y - y = 7.2727\ldots - 0.072\ldots = 7.2$ and $\frac{7.2}{99}$ and $\frac{3}{10} + \frac{7.2}{99} = \frac{297 + 72}{990} = \frac{369}{990} = \frac{41}{110}$ oe <i>Working required</i>	Shown		A1 Dep on M1 and use of algebra for completion to $\frac{41}{110}$ NB: this is a 'show that' question and requires students to clearly show steps that could be used to change the recurring decimal into the given fraction– some may have slight variations to this mark scheme but if the stages can be clearly followed then marks should be awarded.



	Award method marks in either order			
(b)	eg $\frac{\sqrt{125} + \sqrt{80}}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}}$ or $\frac{\sqrt{375} + \sqrt{240}}{3}$ or $\frac{5\sqrt{5} + 4\sqrt{5}}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}}$ or $\frac{5\sqrt{15} + 4\sqrt{15}}{3}$ or $\frac{9\sqrt{5}}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}}$ or $\frac{9\sqrt{15}}{3}$ or $\frac{9\sqrt{5}}{\sqrt{3}} = \frac{\sqrt{405}}{\sqrt{3}}$ oe or		3	M1 For rationalising by multiplying by $\frac{\sqrt{3}}{\sqrt{3}}$ or $\frac{-\sqrt{3}}{-\sqrt{3}}$ or for $\frac{9\sqrt{5}}{\sqrt{3}} = \frac{\sqrt{405}}{\sqrt{3}}$
	eg $\frac{\sqrt{125} + \sqrt{80}}{\sqrt{3}} = \frac{5\sqrt{5} + 4\sqrt{5}}{(\sqrt{3})}$ or $\frac{\sqrt{375} + \sqrt{240}}{3} = \frac{5\sqrt{15} + 4\sqrt{15}}{3}$ (must see $\frac{\sqrt{375} + \sqrt{240}}{3}$ before simplifying)			M1 For simplifying the individual surds – either before rationalisation or after rationalisation (for the given surds, we do not need to see the denominator)
	Working required	$\sqrt{135}$		A1 dep on M2 SCB1 for $\sqrt{135}$ gained with no method marks awarded SCB2 for $\sqrt{135}$ and rationalisation also shown or $\sqrt{135}$ and simplifying the numerator shown
Total 5 marks				

Question	Working	Answer	Mark	Notes
4	$0.07 \times 10\,800 (= 756)$ oe $10\,800 + '756'$	11 556	3	M1 M1 M2 for $1.07 \times 10\,800$ oe A1
5 (a)		<i>P</i> in correct region on overlay	2	M1 Correct bearing ($\pm 2^\circ$) or correct distance (± 2 mm) A1 Fully correct position for <i>P</i>
(b) (i)		154	2	B1 150 – 158 ft from diagram
(ii)		332		B1 330 – 334 ft from diagram
6	$360 \div 8 (= 45)$ or $180 - (360 \div 8) (= 135)$ or $\frac{6 \times 180}{8} (= 135)$ oe e.g. $\frac{540 - 112 - 112 - 84}{2} (= 116)$ or $\frac{540 - 308}{2} (= 116)$ or $\frac{232}{2} (= 116)$ e.g. '135' – '116' or $180 - '116' - '45'$	19	4	M1 Correct method to find the interior or exterior angle of octagon M1 Correct method to find a missing angle from pentagon M1 Complete method A1

Question	Working	Answer	Mark	Notes
12	0, 4, 6, 9, 17, 21, 32, 42, 51, 69, 102	45	3	M1 for identifying 6 or 51 from ordered list or attempt to find 3 rd and 9 th seen (from an ordered list) M1 for identifying 6 and 51 A1 for 45
13	$1 + 0.65 + 1.22 (=2.87)$ or $100 + 65 + 122 (=287)$ $861 \div 2.87$ or $(861 \div 287) \times 100$ oe	300	3	M1 oe Note: $861 \div 3 = 287$ is M0 M1 A1
14	(a)(i) (ii) (iii) (b) $177\ 147 \div 2187 (= 81)$ or $a = 81$ $2187 \div 81 (= 27)$ or $b = 27$	a^2 ab^4 $\frac{1}{3}b$ $x = 4, y = 3$	1 1 1 3	B1 B1 B1oe M1 or $x + y = 7$, M1 $2x + y = 11$ A1 $x = 4$ and $y = 3$



5	$\pi \times 7.2^2 \div 2$ (= 81.4....)			M1	allow 81.3 – 81.5 for area of semi circle
	“81.4” $\div 6$ (= 13.5...) or 12×6 (= 72) or “81.4” $\div 12$ (= 6.7...)			M1	(dep) allow 13.5 – 13.6 for the number of boxes needed (NB: $12 \times 6 = 72$ alone is 0 marks)
		No with correct figures	3	A1	
Total 3 marks					
6	$(x \pm 9)(x \pm 4)$	$\frac{-(-5) \pm \sqrt{(-5)^2 - 4 \times 1 \times (-36)}}{2 \times 1}$ or $\frac{5 \pm \sqrt{25 + 144}}{2}$		M1	or $(x + a)(x + b)$ where $ab = -36$ or $a + b = -5$ OR correct substitution into quadratic formula (condone one sign error in a , b or c) (if + rather than $\pm$ shown then award M1 only unless recovered with answers)
	$(x - 9)(x + 4)$	$\frac{5 \pm \sqrt{169}}{2}$ or $\frac{5 \pm 13}{2}$		M1	or $\frac{5 \pm \sqrt{169}}{2}$ or $\frac{5 \pm 13}{2}$
		9, -4	3	A1	dep on at least M1
Total 3 marks					
7	$20.40 \div (1 - 0.15)$			M2	for a complete method eg $20.40 \div (1 - 0.15)$ for $20.40 \div (100 - 15)$ (= 0.24) (M1) or e.g. $0.85x = 20.40$
		24	3	A1	
Total 3 marks					

8	$(10 - 2) \times 180$ oe (= 1440) or $(6 - 2) \times 180$ oe (= 720)		4	M1 for a method to find the sum of the interior angles of a decagon or a hexagon
	'1440' - 148 - 2×150 - 2×168 - 2×134 - 2×125 (=138) or '1440' - 1302 (= 138) or '720' - 148÷2 - 150 - 168 - 134 - 125 (= 69) or '720' - 651 (= 69)			M1 Allow omission of one angle
	360 - '138' or 360 - 2 × '69'			M1
		222		A1
	Alternative method (exterior angles)			
	$360 - 2 \times (180 - 125) - 2 \times (180 - 134) - 2 \times (180 - 168) - 2 \times (180 - 150) - (180 - 148)$ or $360 - 2 \times 55 - 2 \times 46 - 2 \times 12 - 2 \times 30 - 32$		4	M2 If not M2 then award M1 for at least 3 or (180 - 125) , (180 - 134) , (180 - 168) , (180 - 150), (180 - 148) or at least 3 of 55, 46, 12, 30, 32
	180 + '42'			M1
		222		A1
				Total 4 marks

9	E.g. $1 - 0.2$ (= 0.8) or $100(\%) - 20(\%)$ (= 80(%)) or $\frac{1080}{80}$ (= 13.5) oe		3	M1
	E.g. $1080 \div 0.8$ or $1080 \div 80 \times 100$ or '13.5' × 100 $1080 \times 100 \div 80$			M1 for a complete method
		1350		A1
				Total 3 marks

6	$x \times 1.05 = 1.26$ oe eg ($x =$) $1.26 \div 1.05$ oe (= 1.2)	or $30 \times 1.26 (= 37.80)$	or $30 \div 1.05 (= 28.57)$		3	M1	
	$30 \times "1.2"$	"37.80" $\div 1.05$	"28.57..." $\times 1.26$			M1	
						36	A1 cao If no marks awarded, SC B1 for one operation used correctly, even with another incorrect operation. eg $1.26 \times 0.95 \times 30$ oe or $1.26 \times 1.05 \times 30$ oe or $1.26 \div 0.95 \times 30$ oe
							Total 3 marks

7		$y \geq 1$ oe $x \leq 3$ oe $y \leq 3x - 2$ oe		3	B1 Allow $1 \leq y \leq 7$ B1 Allow $1 \leq x \leq 3$ B1 Condone < and > in place of $\leq$ and $\geq$ throughout. SC B1 if no marks awarded, recognition of lines $x = 3$ and $y = 1$. Allow incorrect inequality and condone use of equals signs eg $y < 1, x = 3$ may be seen on diagram.	
						Total 3 marks

8	$0.22x = 5.48$ oe or (1% =) $5.48 \div 22 (= 0.24909\dots)$ or $100 \div 22 (= 4.54\dots)$			M1
	(x =) $5.48 \div 0.22$ oe or (100% =) $5.48 \div 22 \times 100$ or “0.24909...” $\times 100$ or $5.48 \times “4.54\dots”$			M1
	<i>Correct answer scores full marks (unless from obvious incorrect working)</i>	24.9		A1 awrt 24.9
				Total 3 marks

8 ALT 1	$0.22x = 5\,480\,000$ oe or (1% =) $5\,480\,000 \div 22 (= 249\,090.9091\dots)$ or $100 \div 22 (= 4.54\dots)$			M1
	$5\,480\,000 \div “0.22”$ oe or (100% =) $5\,480\,000 \div 22 \times 100$ or “249 090.9091...” $\times 100$ or $5\,480\,000 \times “4.54\dots”$			M1
	<i>Correct answer scores full marks (unless from obvious incorrect working)</i>	24 900 000		A1 awrt 24 900 000
				Total 3 marks



6	$12 \times 2.45 (= 29.4)$ or $21 \div 12 (= 1.75)$		3	M1
	$\frac{'29.4' - 21}{21} \times 100$ oe or $\frac{2.45 - '1.75'}{'1.75'} \times 100$ oe or $(\frac{'29.4' - 21}{12}) \div '1.75' \times 100$ oe or $(\frac{2.45}{'1.75'} \times 100) - 100$ oe			M1 or an answer of 140(%)
	<i>Correct answer scores full marks (unless from obvious incorrect working)</i>	40		A1
				Total 3 marks

8	$1 + 0.12 (= 1.12)$ oe or $100(\%) + 12(\%) (=112(\%))$ or $\frac{18.20}{112} (= \frac{13}{80} = 0.1625)$ or $x + 0.12x = 18.2(0)$ or $x \times 1.12 = 18.2(0)$		3	M1
	eg $18.2(0) \div "(1 + 0.12)"$ oe or $\frac{18.2(0)}{112} \times 100$ oe			M1 for a complete method
		16.25		A1
				Total 3 marks



13	eg $1.2 \times 0.65 (= 0.78)$ or $1.2L \times 0.65W (= 0.78LW)$ or $1.2 \times 0.65 \times 100 (= 78)$ or $1.2L \times 0.65W \times 100 (= 78LW)$		3	M1 allow use of other variables to L and W as long as clearly labelled as length and width allow $(1 + 0.2)$ as their 1.2 and $(1 - 0.35)$ as their 0.65
	eg $(1 - "0.78") \times 100$ or $(LW - "0.78LW") \times 100 (= 22LW)$ or $100 - "78"$ or $100LW - "78LW" (= 22LW)$			M1 method to find the percentage reduction, allow the subtraction to be written the other way around eg $"78" - 100$
	Correct answer scores full marks (unless from obvious incorrect working)	22		A1 allow -22
Total 3 marks				

ALTERNATIVE Q13 mark scheme (using values for L and W)

13	eg $1.2 \times x$ and $0.65 \times y$ where x and y are positive numbers		3	M1 accept any positive values for x and y allow $(1 + 0.2)$ as their 1.2 and $(1 - 0.35)$ as their 0.65
	eg $\left(1 - \frac{1.2x \times 0.65y}{xy}\right) \times 100$ or $\left(\frac{xy - 1.2x \times 0.65y}{xy}\right) \times 100$			M1 method to find the percentage reduction, allow the subtraction to be written the other way around eg $\left(\frac{1.2x \times 0.65y}{xy} - 1\right) \times 100$
	Correct answer scores full marks (unless from obvious incorrect working)	22		A1 allow -22
Total 3 marks				

4	$1 + 0.15 (= 1.15)$ or $x + 0.15x = 943$ or $100(\%) + 15(\%) (= 115(\%))$ or $\frac{943}{115} (= 8.2)$ oe		3	M1
	$943 \div "1.15"$ or $943 \div "115" \times 100$ or $943 \times 100 \div "115"$ oe or 8.2×100			M1 dep on M1
	<i>Working not required, so correct answer scores full marks (unless from obvious incorrect working)</i>	820		A1
				Total 3 marks
5	$(5 - 2) \times 180 (= 540)$ or $360 \div 5 (= 72)$		4	M1 NB If angles are on the diagram they must be from correct working and correctly assigned
	$\frac{540}{5} (= 108)$ or $180 - "72" (= 108)$ or $180 - 96 (= 84)$			M1
	$"72" + "84"$ or $360 - (96 + "108")$ or $180 - ("108" - "84")$			M1 for a complete method
	<i>Working required</i>	156		A1 dep on M2
				Total 4 marks



8	$1 - 0.17$ or 0.83 or $\frac{83}{100}$ or $100(\%) - 17(\%)$ or $83(\%)$ or $\frac{6225}{83}$ (= 75) oe		3	M1
	$6225 \div "0.83"$ or $6225 \div "83" \times 100$ or $6225 \times 100 \div "83"$ oe or 75×100			M1
	<i>Working not required, so correct answer scores full marks (unless from obvious incorrect working)</i>	7500		A1
				Total 3 marks



3	eg $360 - (148 + 50) (= 162)$ or $180 - 50 (= 130)$ or $180 - 148 (= 32)$		4	M1	for method to interior angle of the polygon or start to the method of finding the exterior angle of the polygon	
	eg $180 - "162" (= 18)$ or $148 - "130" (= 18)$ or $50 - "32" (= 18)$	eg $180(n - 2) = "162"n$ or $180(n - 2) \div n = "162"$		M1	for method to find the exterior angle or for setting up an equation using sum of interior angles formula	
	eg $360 \div "18"$	eg $(n =) 360 \div (180 - "162")$		M1	for a complete method	
	Working required			20	A1	dep on M1
Total 4 marks						

4	(a)		12	1	B1 accept x^{12}
	(b)		5	1	B1 accept y^5
	(c)		$125a^{12}r^6$	2	B2 for $125a^{12}r^6$ (B1 for a product in the form $ka^p r^q$ where 2 from k , p or q are correct eg $5a^{12}r^6$ Allow $125a^{12}$ or $125r^6$ or $a^{12}r^6$ so as long as not added to any other terms)
					Total 4 marks

5	eg $1 - 0.28 (= 0.72)$ oe or $0.72x = 198$ or $100(\%) - 28(\%) (= 72(\%))$ or $\frac{198}{72} (= 2.75)$ oe		3	M1 for a correct first step
	eg $(x =) 198 \div "0.72"$ oe or $198 \div "72" \times 100$ oe or $"2.75" \times 100$			M1 for a complete method
	<i>Correct answer scores full marks (unless from obvious incorrect working)</i>	275		A1 cao
				Total 3 marks



Question	Working	Answer	Mark	Notes	
7*	$0.07 \times 4000 (= 280)$ or $1.07 \times 4000 (= 4280)$		3	M1 for finding 7% of 4000 or 107% of 4000	M2 for $1.07^3 \times 4000$ or $1.07^4 \times 4000 (= 5243....)$
	$4000 + "280" (= 4280)$ or $0.07 \times "4280" (= 299.6)$ and $"4280" + "299.6" (= 4579.6)$ and $0.07 \times "4579.6" (= 320.572)$ or $"280" + "299.6" + "320.572" (= 900(.172))$			M1	
	<i>Working not required, so correct answer scores full marks (unless from obvious incorrect working)</i>	4900		A1 allow answers in the range 4900 – 4901 If no other mark awarded, SCB1 for $4000 \times 0.07 \times 3 (= 840)$ or $4000 \times 0.21 (= 840)$ or $4000 + 4000 \times 0.07 \times 3 (= 4840)$ or $4000 \times 1.21 (= 4840)$ or $0.93 \times 4000 (= 3720)$ or $0.79 \times 4000 (= 3160)$ or $0.93^3 \times 4000 (= 3217...)$ or $4000 \times 1.07^2 (= 4579...)$	
Total 3 marks					



7	$10.5 = \frac{48.3}{v}$ or $10.5v = 48.3$ or $(v =) \frac{48.3}{10.5}$		2	M1 oe for substituting 10.5 and 48.3 correctly into a correct formula for density; may use any letter for the volume
	Correct answer scores full marks (unless from obvious incorrect working)	4.6		A1 allow $\frac{23}{5}$ or $4\frac{3}{5}$ oe
				Total 2 marks
8	$60 \times 7 (= 420)$ or $46 \times 3 (= 138)$		3	M1 may be embedded within an equation
	"420" – "138" (= 282)			M1 for a method to find the sum of the 4 numbers Allow this mark if they do further incorrect work using 282
	Correct answer scores full marks (unless from obvious incorrect working)	70.5		A1 allow $\frac{141}{2}$ oe eg $\frac{282}{4}$ or $70\frac{1}{2}$
				Total 3 marks
9	$1 - 0.15 (= 0.85)$ or $100(\%) - 15(\%) (= 85(\%))$ or $\frac{612}{85} (= 7.2)$ oe		3	M1 may be seen embedded Do not allow $(1 - 15\%)$ unless processed correctly
	$612 \div "0.85"$ oe or $612 \div "85" \times 100$ oe or "7.2" $\times 100$			M1 for a complete method
	Correct answer scores full marks (unless from obvious incorrect working)	720		A1
				Total 3 marks

Question	Working	Answer	Mark	Notes
2	$\frac{3450}{2+6+7} (=230)$ or $\frac{2}{2+6+7} \times 3450 (=460)$ or $\frac{7}{2+6+7} \times 3450 (=1610)$ or $\frac{7-2}{2+6+7} \left(=\frac{1}{3} \right)$		3	M1
	$(7-2) \times "230"$ or $7 \times "230"$ or $2 \times "460"$ or "1610" – "460" or $"\frac{1}{3}" \times 3450$			M1
		1150		A1
				Total 3 marks

3	$\frac{8}{100} \times 20000 (=1600)$		4	M1oe	Award M2 for 20000×1.08 or 21600
	$20000 + \frac{8}{100} \times 20000 (=21600)$ or $(20\,000 - 19200) + \frac{8}{100} \times 20000 (=2400)$			M1	
	$\frac{"21600"-19200}{19200} (\times 100)$ or $\frac{"2400"}{19200} (\times 100)$ or "21600" ÷ 19200 (×100) oe			M1 or for 1.125 or $\frac{9}{8}$ or 112.5%	
		12.5		A1 oe	
					Total 4 marks



Question	Working	Answer	Mark	Notes
3	eg $(6.3 \times 1000) \div 210 (= 30)$	343.2(0)	4	M1 for a method to find the number of candles, could work in grams or kg
	$\frac{2}{5} \times 30 \times 13 (= 156)$			M1 for a method to find money made from the \$13 candles
	$\left(1 - \frac{2}{5}\right) \times 30 \times 0.8 \times 13 (= 187.20)$			M1 for a method to find money made from the reduced candles
				A1
				Total 4 marks

4	(a)	$3c - 21 + 6c + 8$	$9c - 13$	2	M1 For 3 or 4 terms correct
	(b)	$x^2 - 2x + 7x - 14$	$x^2 + 5x - 14$	2	M1 For 3 correct terms or for 4 correct terms ignoring signs or for $x^2 + 5x + k$ for any non-zero value of k or for $.... + 5x - 14$
	(c)	$7y(4y - 3)$		2	B2 B1 for $y(28y - 21)$ or $7(4y^2 - 3y)$ or $7y(4y + k)$ or $7y(ay - 3)$
	(d)	eg $7x - 2 = 4(3x + 1)$ oe	$-\frac{6}{5}$	3	M1 correct first step
		$7x - 12x = 4 + 2$ oe or $-2 - 4 = 12x - 7x$ oe		M1 for rearranging the x terms on one side and the numerical terms on the other. ft rearranging their expansion $ax + b = cx + d$ eg $7x - 2 = 12x + 4$	
		A1 oe, dep on M1			
				Total 9 marks	



14	$0.85 \times x^2 = 1.0285$ or $85 \times x^2 = 102.85$ oe or $(x^2 =) 1.0285 \div 0.85$ or $(x^2 =) 102.85 \div 85$ oe or 1.21 oe		4	M2 for a correct equation using their chosen letter or value in place of letter, or a correct division or 1.21 seen otherwise: (M1 for either 0.85 or 1.0285 seen)
	$(x =) \sqrt{1.0285 \div 0.85}$ or $(x =) \sqrt{102.85 \div 85}$ oe or $(x =) 1.1(0)$			M1 for a correct expression or value for x
		10		A1
Total 4 marks				

Alternative Mark Scheme for Q14				
14	$\left(\frac{100+y}{100}\right)^2 \times 0.85 = 1.0285$ oe or $\left(\frac{100+y}{100}\right)^2 = 1.21$ oe or $10^4 + 200y + y^2 = 12100$ oe		4	M2 for a correct equation using their chosen letter, otherwise: (M1 for either 0.85 or 1.0285 seen)
	$\frac{100+y}{100} = 1.1$ or $100+y = 110$ oe or $(y+210)(y-10) = 0$			M1 for a correct equation involving y with no square terms or a correct method for solving the quadratic: If factorising, allow brackets which expanded give 2 out of 3 terms correct – if using formula or completing the square allow one sign error and some simplification – allow as far as eg $\frac{-200 \pm \sqrt{40000 + 8400}}{2}$ or eg $(y+100)^2 - 12100 = 0$ oe
		10		A1
Total 4 marks				

4	eg $0.45 \times 180 (= 81)$ oe OR $\frac{15}{180} \left(= \frac{1}{12} \text{ or } 0.0833... \right)$ OR $\frac{15}{180} \times 100 (= 8.3(33...)\%)$		4	M1 for a method to find the number of students studying German OR the number of students studying French as a fraction or decimal of the total students OR a method to find the percentage of students studying French 81 may be seen as part of an equation
	eg $180 - 15 - "81" (= 84)$ or $"81" + 15 (= 96)$ OR $1 - \left(\frac{1}{12} + \frac{45}{100} \right) = \left(\frac{7}{15} \text{ or } 0.466... \right)$ or $\frac{1}{12} + \frac{45}{100} = \left(\frac{8}{15} \text{ or } 0.533... \right)$ OR $100 - ("8.3" + 45) (= 46.6(66...) \text{ or } 46.7\%)$ or $"8.3" + 45 (= 53.3(33...) \text{ or } 53.3\%)$			M1 for a method to find the number of students studying Italian/Spanish or French/German OR a method to find the fraction or decimal of students studying Italian/Spanish or French/German OR a method to find the percentage of students studying Italian/Spanish or French/German 84 or 96 may be seen as part of an equation
	eg $\frac{"84"}{180 - "84"} (\times 100) \left(= \frac{7}{8} \text{ or } 0.875 \right)$ or $\frac{"84"}{"96"} (\times 100) \left(= \frac{7}{8} \text{ or } 0.875 \right)$ or $\frac{7}{15} \div \frac{8}{15} \left(= \frac{7}{8} \text{ or } 0.875 \right)$ or $\frac{"46.6"}{"53.3"} (\times 100) (= 0.872...)$			M1 for a complete method to find the fraction or decimal or percentage of Italian/Spanish to French/German
		87.5		A1 accept 87.2 – 87.7
				Total 4 marks



2			3	M1 For area of 2 different faces (ie not 2 triangles)
	$0.5 \times 4.8 \times 3.6 (= 8.64)$ oe or 4.8×3.6 if clear intention for this to be 2 triangles $7 \times 3.6 (= 25.2)$ $7 \times 4.8 (= 33.6)$ $7 \times 6 (= 42)$ (all measurements with intention to add)			M1 For adding together 5 areas, at least 4 of which are correct NB: $(3.6 + 4.8 + 6) \times 7 (= 100.8)$ is 3 faces
	Correct answer scores full marks (unless from obvious incorrect working)	118		A1 118.1 or 118.08
				Total 3 marks

3		$(x =) 3$	3	B1
		$(y =) 6$		B1
		$(z =) 10$		B1
				Total 3 marks

4	$1600 \times 0.16 (= 256)$ oe or $1 - 0.16 (= 0.84)$ oe $1600 - "256"$ or $1600 \times "0.84" (= 1344)$		4	M1
	$\frac{"1344"}{1400} (= 0.96)$ or $\frac{1400 - "1344"}{1400} (= 0.04)$ or $\frac{"1344"}{1400} \times 100 (= 96)$ or $\frac{1400 - "1344"}{1400} \times 100$			M1
	Correct answer scores full marks (unless from obvious incorrect working)	4		A1 SCB1 for 1856 seen if no other marks awarded
				Total 4 marks

3	$0.7 \times 60 \times 22 (= 924)$ oe or $(1 - 0.7) \times 60 \times 19 (= 342)$ oe OR $0.7 \times 60 \times \left(22 - \frac{780}{60}\right) (= 378)$ oe or $(1 - 0.7) \times 60 \times \left(19 - \frac{780}{60}\right) (= 108)$ oe		4	M1 for finding income for the 22 dirhams notebooks or the 19 dirhams notebooks OR for finding the profit for the 22 dirhams notebooks or the 19 dirhams notebooks
	$0.7 \times 60 \times 22 (= 924)$ oe and $(1 - 0.7) \times 60 \times 19 (= 342)$ oe OR $0.7 \times 60 \times \left(22 - \frac{780}{60}\right) (= 378)$ oe and $(1 - 0.7) \times 60 \times \left(19 - \frac{780}{60}\right) (= 108)$ oe			M1 for finding income for the 22 dirhams notebooks and the 19 dirhams notebooks OR for finding the profit for the 22 dirhams notebooks and the 19 dirhams notebooks, 1266 or 486 implies M2
	eg $\frac{"924"+"342"-780}{780} \times 100$ or $\frac{"924"+"342"}{780} \times 100 - 100$ or $\frac{"378"+"108"}{780} \times 100$ or $\frac{486}{780} \times 100$			M1 for a complete method to find percentage profit
	Correct answer scores full marks (unless from obvious incorrect working)	62.3		A1 awrt 62.3, allow 62 from correct working
				Total 4 marks



3	$1500 + (36 \times 450) (= 17\,700)$		4	M1
	"17 700" – 12 500 (= 5200) oe "17 700" or $\frac{17\,700}{12\,500} (=1.416)$ oe			M1
	$\frac{5200}{12500} (\times 100)$ oe or $0.416 (\times 100)$ or $\frac{17\,700}{12\,500} \times 100 \frac{8}{8} (- 100)$ or $141.6 (- 100)$			M1
	<i>Working not required, so correct answer scores full marks (unless from obvious incorrect working)</i>	41.6		A1 allow 42 from correct working
Total 4 marks				

4	(a)	$1 - 0.58 (= 0.42)$ or $100 - 58 (= 42)$ $0.58 + 2x + x = 1$ oe		2	M1
		<i>Working not required, so correct answer scores full marks (unless from obvious incorrect working)</i>	0.14		A1 oe eg 14% (must have % sign) or $\frac{7}{50}$ etc SCB1 for an answer of 14 if no other marks are awarded
	(b)	250×0.58 oe or $58 + 58 + (58 \div 2)$ oe		2	M1 or for $\frac{145}{250}$
		<i>Working not required, so correct answer scores full marks (unless from obvious incorrect working)</i>	145		A1 cao
Total 4 marks					



6	eg $1 - \frac{1}{6} = \frac{5}{6}$ or $1 - 0.16(666...) (= 0.83(333...))$ oe or $100(\%) - 16(.666...)(\%) (= 83(.333...)(\%))$ oe or $1 - 0.2 (= 0.8)$ oe or $100(\%) - 20(\%) (= 80(\%))$		4	M1 Allow eg $1 - 0.16 (= 0.84) (= 84(\%))$ $1 - 0.17 (= 0.83) (= 83(\%))$ rounded or truncated
	140, $\frac{5}{6}$ (= 168) oe or $140 \div "0.83(333...)" (= 168)$ oe eg $140 \div 83.33 \times 100 (= 168)$ or $136 \div "0.8" (= 170)$ oe eg $136 \div 80 \times 100 (= 170)$			M1 Allow eg $140 \div "0.84" = 166(.666...)$ $140 \div "0.83" = 168(.674...)$ rounded or truncated
	140, $\frac{5}{6}$ (= 168) oe or $140 \div "0.83(333...)" (= 168)$ oe and $136 \div "0.8" (= 170)$ oe			M1 Allow eg $140 \div "0.84" = 166(.666...)$ $140 \div "0.83" = 168(.674...)$ rounded or truncated
	<i>Working not required, so correct answer scores full marks (unless from obvious incorrect working)</i>	2		A1 Allow -2
				Total 4 marks



7	$475 \times 0.16 (= 76)$ oe or $475 \times (1 - 0.16) (= 399)$ oe		4	M1 (working for shop A)
	$1 - 0.15 (= 0.85)$ or $x - 0.15x = 408$ or $100(\%) - 15(\%) (= 85(\%))$ or $\frac{408}{85} (= 4.8)$ oe			M1 (working for shop B)
	$408 \div "0.85" (= 480)$ or $408 \div "85" \times 100 (= 480)$ or $408 \times 100 \div "85" (= 480)$ oe or $"4.8" \times 100 (= 480)$ or $\frac{408}{85} \times 100 (= 480)$			M1 (working for shop B)
	Working required	A and 72 and 76 seen		A1 dep on M2 for A with correct working (72 and 76 seen)
				Total 4 marks



3	eg $\sin 65 = \frac{AB}{8.4}$ or $\frac{AB}{\sin 65} = \frac{8.4}{\sin 90}$		3	M1 for setting up a trig equation in AB
	eg $(AB =) 8.4 \sin 65$ or $(AB =) \frac{8.4 \sin 65}{\sin 90}$			M1 for a complete method
		7.61		A1 accept 7.61 – 7.613
				Total 3 marks

4	eg $\frac{2}{5} \times 150 (= 60)$ or eg $0.32 \times 150 (= 48)$		5	M1 for finding the number of small mugs or number of medium mugs
	eg $150 - "60" - "48" (= 42)$			M1 for finding the number of large mugs
	eg $"60" \times 8.50 + "48" \times 11.20 + "42" \times 14.20 (= 1644)$ or $510 + 537.6 + 596.4 (= 1644)$			M1 for working out the income, Profit = 504 implies M3
	eg $\frac{"1644" - 1140}{1140} \times 100$ or $\frac{"1644"}{1140} \times 100 - 100$			M1 (indep) for a complete method to find the percentage profit for their total income (must be greater than 1140) An answer of 144 implies M4
		44		A1 44 or better (44.2105...)
				Total 5 marks



8	(a)	(231 776 – 228 314) ÷ 228 314 or 3462 ÷ 228 314 (= 0.01516...) or 231 776 ÷ 228 314 (= 1.01516...)		2	M1
			1.5		A1 for 1.5 or better (1.516...) (be careful: $3462 \div 231\,776 \times 100 = 1.49\dots$)
	(b)	231 776 ÷ 1.077 oe		3	M2 If not M2 then M1 for $100 + 7.7 (=107.7)$ or $1 + 0.077 (=1.077)$ seen but not $1 + 7.7\%$
			215 000		A1 for 215 000 or better (215 205.19...) (if no marks awarded SCB1 for 212000 or better (211990.71...))
Total 5 marks					
9		(0×13) + 1×17 + 2×8 + 3x + 4×11 or (0 +) 17 + 16 + 3x + 44 (= 77 + 3x)			M1 at least 3 correct products with intention to add. eg award for 77 seen as this is sum of 3 products
		(13+17+8+x+11) oe eg 49 + x or 98 + 2x			M1 Sum for total frequency or (frequency × 2)
		$\frac{77+3x}{49+x} = 2$ oe e.g. "77 + 3x" = 2("49 + x") "49 + x"			M1 for use of mean in valid equation (ft their values for sum of products and their total frequency if M2 awarded previously)
			21		A1
Total 4 marks					



14	$1 + 1.45 (= 2.45)$ or $1 + \frac{29}{20} (= \frac{49}{20})$ or $B = 1.45A$ oe or $B = \frac{29}{20}A$ oe or $A + 1.45A$ or $A + \frac{29}{20}A$ or $2.45A$ or $(A : B =) 100 : 145$ oe or $100 + 145 (= 245)$ oe or $(B : C =) 3 : 2$ oe or $B = 1.5C$ oe		5	B1 must identify ratios with Abel and Bahira or Bahira and Chanda Allow any letters for A, B and C
	$A + 1.45A = 15\,435$ or $15\,435 \div "2.45"$ or $15\,435 \div "\frac{49}{20}"$ or $15\,435 \div "245" \times 100$ or $63 \times 100 (= 6300)$	M2 for $15\,435 \div \left(\frac{1}{1.45} + 1\right) (= 9135)$ oe or $15\,435 \div \left(\frac{49}{29}\right) (= 9135)$ oe		M1 for a method to find Abel's savings or for 6300
	$15\,435 - "6300"$ or $1.45 \times "6300"$ or $145 \times "63" (= 9135)$			M1 for a method to find Bahira's savings or for 9135
	$"9135" \div \frac{3}{2}$ oe or $"9135" \times \frac{2}{3}$ oe			M1 for a method to find to find Chanda's savings
	Working not required, so correct answer scores full marks (unless from obvious incorrect working)	6090		A1
	Total 5 marks			



3	eg $200 \div (3 + 2) (= 40)$		5	M1	for a method to find one 'share' of the ratio
	eg $3 \times "40" (= 120)$ and $2 \times "40" (= 80)$			M1	for a method to find the number of white loaves and the number of brown loaves
	eg " 120 " $\times 1.50 (= 180)$ oe and " 80 " $\times 1.75 (= 140)$ oe or " 120 " $\times 0.4 (= 48)$ oe and " 80 " $\times 0.6 (= 48)$ oe or $0.4 \times 1.50 (= 0.6)$ oe and $0.6 \times 1.75 (= 1.05)$ oe			M1	for a method to find income from white loaves and brown loaves or number of white loaves and brown loaves that are entirely profit or profit from a single white loaf or a single brown loaf
	eg $0.4 \times "180" (= 72)$ oe and $0.6 \times "140" (= 84)$ oe or " 48 " $\times 1.50 (= 72)$ oe and " 48 " $\times 1.75 (= 84)$ oe or " 0.6 " $\times "120" (= 72)$ oe and " 1.05 " $\times "80" (= 84)$ oe			M1	for a complete method to find the total profit for the white loaves and the total profit for the brown loaves
	Correct answer scores full marks (unless from obvious incorrect working)	156		A1	cao award SCB4 for an answer of 164 or 174
Total 5 marks					



4	(a)	$357 \div 0.17$ oe or $0.17N = 357$ or $\frac{17}{100} \times N = 357$ oe or $\frac{357 \times 100}{17}$ oe eg $357 \times 5.8(82\dots)$		2	M1 a correct calculation for N or a correct equation in N (not $17\% \times N = 357$)
		<i>Correct answer scores full marks (unless from obvious incorrect working)</i>	2100		A1 cao
	(b)	$806 - 650 (= 156)$ or $\frac{806}{650} (=1.24)$ oe		3	M1
		$\frac{806 - 650}{650} (\times 100) (= 0.24(\times 100))$ or “1.24” $\times 100 (= 124)$ or “1.24” $- 1 (= 0.24)$			M1 a correct calculation for the percentage increase or seeing 124 or 0.24 as either the answer or in part of the working.
		<i>Correct answer scores full marks (unless from obvious incorrect working)</i>	24		A1 cao (SCB1 if no marks scored for an answer of 19.3 – 19.4)
					Total 5 marks

Question	Working	Answer	Mark	Notes
4 (a)	$1236.5 - 1126.5$ or 110 or $\frac{1236.5}{1126.5}$ or $1.09(7647\dots)$ or $\frac{1236.5}{1126.5} \times 100$ or $109(7647\dots)$			M1
	$\frac{1236.5 - 1126.5}{1126.5}$ or "110" or $\left(\frac{1236.5}{1126.5} - 1\right)$ or $(1.09(764\dots) - 1)$ or $\frac{1236.5}{1126.5} \times 100 - 100$ or $0.0976(475\dots)$			M1 for method that would result in 9.76... or 0.0976...
		9.76	3	A1 for 9.76 - 9.765
(b)	1126.5×1.19 oe			M2 if not M2 then award M1 for
				$\frac{19}{100} \times 1126.5$ oe or $214(.035)$
		1341	3	A1 for 1340 - 1342

6	(a)	$4.25 \times 0.08 (= 0.34)$ oe		3	M1	M2 for 4.25×1.08 oe
		$4.25 + "0.34"$			M1	
			4.59		A1	SC: B1 for $4.25 \times 0.92 (= 3.91)$ oe
	(b)	$9.45 \div 108 (= 0.0875)$ oe		3	M1	M2 for $9.45 \div 1.08$
		$9.45 \div 108 \times 100$ oe			M1	
			8.75		A1	
Total 6 marks						

7		$7.5^2 - 6^2 (= 20.25)$		4	M1	OR for a correct trig statement involving one of the angles e.g. $\cos BAM = \frac{6}{7.5}$ or $\sin ABC = \frac{6}{7.5}$ where M is the midpoint of BC
		$\sqrt{7.5^2 - 6^2} (= 4.5)$			M1	OR for a method to find one of the angles in the triangle e.g. $BAM = \cos^{-1}\left(\frac{6}{7.5}\right) (= 36.8\dots)$ or $ABC = \sin^{-1}\left(\frac{6}{7.5}\right) (= 53.1\dots)$
		"4.5" $\times 6$ oe			M1	for a complete method to find the area of triangle ABC e.g. $2 \times \frac{1}{2} \times 7.5 \times 6 \times \sin("36.8")$ oe or $2 \times \frac{1}{2} \times 7.5 \times \sqrt{7.5^2 - 6^2} \times \sin("53.1")$ oe
			27		A1	cao
Total 4 marks						



5	(a)	8265 – 7500 (= 765) or $\frac{8265}{7500}$ (= 1.102)		3	M1 8265 – 7500 could be embedded in another calculation.
		$\frac{765}{7500} \times 100$ or “1.102” $\times 100 - 100$ or			M1
			10.2		A1 or
	(b)	e.g. $31.5(0) \div (1 - 0.3)$		3	M2 for a complete method e.g. $31.5(0) \div (1 - 0.3)$
					(M1) for $31.5(0) \div (100 - 30)$ (= 0.45) or e.g. $(1 - 0.3)x = 31.5(0)$
			45		A1
Total 6 marks					

6		e.g. $a = (-3 + 47) \div 2$ (= 22) or $\frac{11+b}{2} = -19$ ($b = -38 - 11 = -49$) or method to add 25 to –3 or method to subtract 25 from 47 or method to subtract 30 from –19 or method to subtract 60 from 11		2	M1 for a correct method to find either coordinate or one coordinate correct. Look for correct method on their diagram, if used.
			$a = 22, b = -49$		A1 both correct
Total 2 marks					



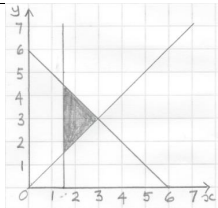
3	$ADC = 180 - 58 (= 122)$ or $EDF = 122$ or $CDE = 58$ or $ADF = 58$			M1 may be seen marked on the diagram
	e.g. $DEF = 58 \div 2$ or $DEF = (180 - 122) \div 2$			M1 complete method to find angle DEF
		29		A1
			5	B2 dep on M2 for fully correct reasons for their method (B1 dep on M1 for one correct reason stated and used) e.g. <u>Allied angles</u> , <u>co-interior angles</u> , <u>Alternate angles</u> , <u>Corresponding angles</u> , <u>Vertically opposite angles</u> are equal (or <u>Vertically opposite angles</u> are equal), <u>Angles</u> on a straight line add up to 180° (or angles on a straight line add to 180°), Sum of <u>two angles</u> in a triangle are equal to <u>opposite exterior angle</u> , <u>Angles</u> in a triangle add up to 180° (or Angles in a triangle add up to 180°), Base angles in an <u>isosceles triangle</u> , <u>Angles</u> in a <u>quadrilateral</u> add up to 360. (accept "4-sided shape" or parallelogram) <u>Opposite angles</u> of a <u>parallelogram</u> are equal
Total 5 marks				
4	eg $76 \div (5 + 2 - 3)$ oe (= 19) or $5x + 2x - 3x = 76$ and $x = 76 \div (5 + 2 - 3) (= 19)$ oe $3 \times "19" (= 57)$			M1 For a correct method to find the value of 1 share
	"57" - 48.5(0)			M1
		8.5(0)	4	M1
				A1
Total 4 marks				



5	a	$1.04 \times 3\,130\,000$ oe			M2 complete method to increase salary by 4%
					M1 for $0.04 \times 3\,130\,000$ oe (= 125 200)
			3255200	3	A1
	b	for $0.15 \times 750\,000$ oe (=112 500) or $0.85 \times 750\,000$ oe (=637 500)	OR		M1 For method to find depreciation for 1 year or value after 1 year
		$0.85 \times "637\,500"$ oe (= 541 875) $0.85 \times "541\,875"$ oe(= 460 593.75)	$750\,000 \times 0.85^3$		M1 for completing method
			460 594	3	A1 accept 460 593 – 460 594
					SC: if no other marks gained award M1 for $0.55 \times 750\,000$ oe (= 412 500) or $0.45 \times 750\,000$ oe (= 337 500)
					accept $(1 - 0.15)$ as equivalent to 0.85 throughout
					Total 6 marks



3	(a)	520 – 465 (= 55) or $\frac{520}{465}$ (=1.118...)	11.8	3	M1	
		"55" 465 ×100 or 100 ×("1.118" – 1) oe			M1	
					A1 11.8 or better (11.827956...)	
	(b)	0.12 × 550 oe (= 66)	484	3	M1 oe	M2 for
		550 – "66"			M1	0.88 × 550 oe
					A1	
				Total 6 marks		

4	(a)(i)		Correct line	1	B1	For $x = 1.5$ drawn
	(ii)		Correct line	1	B1	For $y = x$ drawn
	(iii)		Correct line	1	B1	For $x + y = 6$ drawn
	(b)		Correct region	1	B1	dep on B3 for correctly indicating the region R accept unlabelled or unshaded if clear. Shading can be 'in' or 'out'.
Total 4 marks						

Question	Working	Answer	Mark	Notes
11(a)	eg $100 \div 24 (=124 \text{ [\%]})$ or $1 \div 0.24 (= 1.24)$ or $\frac{180000}{124} (= 1451.6\dots)$		3	M1
	eg $180\,000 \div 1.24$ $180\,000 \div 124 \times 100$ or $180\,000 \times 100 \div 124$ oe			M1 for a complete method
	<i>Working not required, so correct answer scores full marks (unless from obvious incorrect working)</i> <i>NB: this question is one where students could misread the number of zeros (eg one too many or one too few) in the question, up to M2 could be awarded if a correct method is seen with this misread</i>	145 000		A1 accept 145 000 – 145 200 (if a correct answer is seen in working and then rounded incorrectly, award full marks) (if no marks awarded, SCB1 for 223 200 or 223 000)
(b)	for $0.018 \times 120\,000$ oe or 2160 or $1.018 \times 120\,000$ oe or 122 160		3	M1 For finding 1.8% or 101.8% of the value
	$1.018 \times "122\,160" (= 124\,358.88)$ oe and $1.018 \times "124\,358.88" (= 126\,597.34)$ oe			M1 for completing the method
	<i>Working not required, so correct answer scores full marks (unless from obvious incorrect working)</i> <i>NB: this question is one where students could misread the number of zeros in 120 000 (eg one too many or one too few) in the question, up to M2 could be awarded if a correct method is seen with this misread</i>	127 000		A1 or 126 597 – 126 600 (if a correct answer is seen in working and then rounded incorrectly, award full marks) SC: if no other marks gained award M1 for $1.054 \times 120\,000$ oe or 126 480 or 6 480 (accept $(1 + 0.018)$ as equivalent to 1.018 throughout)
				Total 6 marks

6	(a)	$1 + 0.04 (= 1.04)$ or $100(\%) + 4(\%) (= 104(\%))$ or $\frac{634\,400}{104} (= 6100)$ oe		3	M1	
		$634\,400 \div "1.04"$ or $634\,400 \div "104" \times 100$ or $634\,400 \times 100 \div "104"$ oe			M1	
			No and 610 000		A1 dep on M2 for no and 610 000 seen oe E.g. Still (band) B and 610 000 oe	
	(b)	$"0.85" \times "0.85" (= 0.7225)$ oe or $"0.85" - ("0.85" \times 0.15) (= 0.7225)$ or $\frac{"85" \times "85"}{100} (= 72.25)$ oe or [0.85 and 85 must come from correct working]		3	M1 allow use of their amount e.g. $200 \times "0.85" \times "0.85" (= 144.5)$	M2 for $15 + (0.15 \times "85")$ or $15 + 12.75$
		$1 - "0.7225"$ or 0.2775 or $100 - "72.25"$			M1 e.g. $\frac{200 - "144.5"}{200}$ ($\times 100$)	
			27.75		A1 oe allow 27.8 or 28	
Total 6 marks						

2	(a)	$4 \times 6 \times 80 (= 1920)$	$4 \times 6 (= 24)$ or $2160 \div 80 (= 27)$	$2160 \div (80 \times 4) (= 6.75)$		4	M1 for method to work out total income or income from one box or expenditure for one box or income per cup
		$2160 - "1920" (= 240)$ or $\frac{2160}{"1920"} (= 1.125)$	$"27" - "24" (= 3)$ or $\frac{"27"}{"24"} (= 1.125)$	$"6.75" - 6 (= 0.75)$ or $\frac{"6.75"}{6} (= 1.125)$			M1 for working out the profit or income ÷ expenditure
		$\frac{"240"}{"1920"} (\times 100)$ or $0.125 (\times 100)$ or $\left(\frac{2160}{"1920"} - 1\right) (\times 100)$ or $("1.125" - 1) (\times 100)$ or $"1.125" \times 100 (= 112.5)$	$\frac{"3"}{"24"} (\times 100)$ or $0.125 (\times 100)$ or $\left(\frac{"27"}{"24"} - 1\right) (\times 100)$ or $("1.125" - 1) (\times 100)$ or $"1.125" \times 100 (= 112.5)$	$\frac{"0.75"}{6} (\times 100)$ or $0.125 (\times 100)$ or $\left(\frac{"6.75"}{6} - 1\right) (\times 100)$ or $("1.125" - 1) (\times 100)$ or $"1.125" \times 100 (= 112.5)$			M1 for a method to reach one step from the answer ie getting to $\frac{1}{8}$ or 0.125 or 112.5
		Working required			12.5		A1 dep on M1
	(b)				8.5	1	B1 cao
	(c)				125	1	B1 allow 124.9 or 124.99...
							Total 6 marks



10	$16x = 32$ or $32y = 144$	(2, 4.5)	3	M1 for a correct sequence of operations which leads to 1 equation in one unknown, allowing one arithmetical error
	$3 \times '2' + 2y = 15$ or $3x + 2 \times '4.5' = 15$			M1 (dep) substitute found value of one variable in one equation
				A1
				Total 3 marks

11	$72 \times 1000 (= 72000)$ or $72 \div 60 (= 1.2)$ or $72 \div 60 \div 60 (= 0.02)$ or $60 \div 60 \times 1000 (= 3.6)$	20	3	M1 for at least one of $\times 1000$ or $\div 60$
	$\frac{72}{60 \times 60} \times 1000$			M1 (dep) for a complete method
				A1
				Total 3 marks

12	(a)	$6 \times 25 + 6 \times 45 (= 150 + 270 = 420)$	20	4	M1 for $6 \times 25 (=150)$ or $6 \times 45 (=270)$
		"150" + "270" – 350 (= 70) or "420" – 350			M1
		$\frac{70}{350} \times 100$			M1 (dep on M2)
					A1
		Alternative scheme			
		$6 \times 25 + 6 \times 45 (= 150 + 270 = 420)$	20	4	M1 for $6 \times 25 (=150)$ or $6 \times 45 (=270)$
		$\frac{420}{350} \times 100 = 120$			M1
		"120" – 100			M1 (dep on M2)
					A1
	(b)	$500\,000 \div 8 (=62\,500)$	6 250 000	3	M1
		$500\,000 \div 8 \times 100$			M1 for a complete method
					A1
					Total 7 marks



8	(a)	$545 - 500 (= 45)$ or $592 - 545 (= 47)$		4	M1	may be seen as part of a calculation
		$\frac{45}{500} \times 100 (= 9)$ or $\frac{47}{545} \times 100 (= 8.6)$			M1	for one correct expression (allow 8 or 8.7 from a correct expression for 8.6 throughout)
		$\frac{45}{500} \times 100 (= 9)$ and $\frac{47}{545} \times 100 (= 8.6)$			M1	for both correct expressions or having found "9%" finds 109% of 545: $1.09 \times 545 (= 594.05)$ or 9% of 545 (49.05) or having found "8.6%" finds 108.6% of 500: $1.086 \times 500 (= 543)$ or 8.6% of 500 (43)
			No, 9(%) and 8.6(%)		A1	for no oe, 9% and 8.6% seen or no oe and 9% and 594.05 or 8.6% and 543 or No, $49.05 > 45$ or No $594.05 > 592$ oe
Alternative mark scheme for 8(a)						
		$\frac{545}{500} \times 100 (= 109)$ or $\frac{545}{500} (= 1.09)$ and $\frac{592}{545} \times 100 (= 108.6)$ or $\frac{592}{545} (= 1.086)$		4	M3	for both correct expressions which should lead to 109 or 1.09 and 108.6 or 1.086 (allow 108 or 108.7 from correct working for 108.6 or 1.08 or 1.087 from correct working for 1.086 throughout) (if not M3 then award M2 for one of these expressions)
			No, 109(%) and 108.6(%)		A1	oe eg no and 1.09 and 1.086
	(b)	$952 \div 85 \times 100$ oe (=1120)		3	M1	for a method to find price before discount
		$0.15 \times "1120"$ or $"1120" - 952$ oe			M1	for a correct method to find discount
			168		A1	
Total 7 marks						

2	(a)	$720 \div 12 (= 60)$ or $78 \times 12 (= 936)$		4	M1
		$78 - '60' (= 18)$ or $'936' - 720 (= 216)$ $'x' \times 720 = 936$ or $720(1 + \frac{P}{100}) = '936'$ or $('x' =) \frac{'936'}{720} (= 1.3)$ oe			M1
		$\frac{'18'}{60} \times 100$ or $\frac{'216'}{720} \times 100$ $'1.3' \times 100 - 100$ oe or $(1.3 - 1) \times 100$			M1 complete method to find P
			30		A1 ignore extra % sign if given by candidate.
	(b)	$0.18 \times 1600 (= 288)$ oe or $0.82 \times 1600 + 800 (= 2112)$		3	M1 if $1600 \times 18\%$ seen, must have further processing of the 18% or the value (288) given. M2 for $1.5 \times 12.5 (= 18.75)$ or $18 \div 1.5 (= 12)$
		$0.125 \times (1600 + 800) (= 300)$ oe or $(1600 + 800) \times 0.875 (= 2100)$			M1
			Coupon B and correct figures seen		A1 for Coupon B and 288 and 300 or 18.75(%) and 18(%) or 12(%) and 12.5(%) or 2112 and 2100
					Total 7 marks



6	(a)	$7 \times 5 \times 14 (= 490)$ oe or $7 \times 14 (= 98)$ and $400 \div 5 (= 80)$		4	M1 for working out the pay per week or pay per day
		"490" – 400 (= 90) or "98" – "80" (= 18) or "98" $\div$ "80" oe or "490" $\div$ 400 oe or 1.225 oe			M1
		$\frac{90}{400} (\times 100) (= 0.225)$ oe or $\frac{18}{80} (\times 100) (= 0.225)$ oe or $\frac{98}{80} \times 100 (= 122.5)$ oe or $\frac{490}{400} \times 100 (= 122.5)$ oe or "1.225" – 1 (= 0.225)			M1 dep on M2
		Correct answer scores full marks (unless from obvious incorrect working)	22.5		A1 oe allow 23% with M3 awarded
	(b)	E.g. $1 - 0.06 (= 0.94)$ or $100(\%) - 6(\%) (= 94(\%))$ or $\frac{23\,030}{94} (= 245)$ oe		3	M1
		E.g. $23\,030 \div "0.94"$ or $23\,030 \div "94" \times 100$ or $23\,030 \times 100 \div "94"$ or "245" $\times 100$			M1
		Correct answer scores full marks (unless from obvious incorrect working)	24 500		A1
					Total 7 marks

				Total 4 marks
4		$\pi \times 7^2 \times 20 (= 3078.76\dots)$ or 980π	3080	2
				M1 for complete method to find volume
				A1 for answer in range 3077.2 – 3080
				Total 2 marks
5	(a)	$4 \times 120 (= 480)$		M1
		e.g. $120 \div 2 \times 5 (= 300)$ or $120 \times 0.4 \times 7 (= 336)$ or $(120 - '60' - '48') \times 8 (= 96)$ or $120 \times 0.1 \times 8 (= 96)$		M1 for a method to find the income for one of the selling prices
		e.g. $(120 \div 2 \times 5) + (120 \times 0.4 \times 7) +$ $((120 - '60' - '48') \times 8) (= 732)$ or $(120 \div 2 \times 5) + (120 \times 0.4 \times 7) +$ $(120 \times 0.1 \times 8) (= 732)$ or $'300' + '336' + '96' (= 732)$		M1 for a complete method to find the total income
		e.g. $\frac{'732' - '480'}{'480'} \times 100$ or $'252' \div '480' \times 100$ or $\left(\frac{'732'}{'480'} \times 100\right) - 100$ or $152.5 - 100$ or $\left(\frac{'732'}{'480'} - 1\right) \times 100$ or 0.525×100		M1 for a complete method to find the percentage profit
			52.5	5
				A1 accept 53
	(b)	e.g. $1 + 0.2 (= 1.2)$ or $100(\%) + 20(\%) (= 120(\%))$ or		M1

		$\frac{15}{120}$ (= 0.125) oe			
		e.g. $15 \div 1.2$ or $15 \div 120 \times 100$ or $15 \times 100 \div 120$			M1 dep
			12.5(0)	3	A1 accept (£)12.5, (£)12.50p, 1250p if the £ sign is crossed out
					Total 8 marks



5 ALT	(a)	$4 \times 120 (= 480)$			M1
		e.g. $120 \div 2 \times 1 (= 60)$ or $120 \times 0.4 \times 3 (= 144)$ or $(120 - '60' - '48') \times 4 (= 48)$ or $120 \times 0.1 \times 4 (= 48)$			M1 for a method to find the profit of one of the books
		e.g. $(120 \div 2 \times 1) + (120 \times 0.4 \times 3) +$ $((120 - '60' - '48') \times 4) (= 252)$ or $(120 \div 2 \times 1) + (120 \times 0.4 \times 3) +$ $(120 \times 0.1 \times 4) (= 252)$ or $'60' + '144' + '48' (= 252)$			M1 for a complete method to find the total profit
		$'252' \div '480' \times 100$ oe			M1 for a complete method to find the percentage profit
			52.5	5	A1 accept 53
	(b)	e.g. $1 + 0.2 (= 1.2)$ or $100(\%) + 20(\%) (= 120(\%))$ or $\frac{15}{120} (= 0.125)$ oe			M1
		e.g. $15 \div 1.2$ or $15 \div 120 \times 100$ or $15 \times 100 \div 120$			M1 dep
			12.5(0)	3	A1 accept (£)12.5, (£)12.50p, 1250p if the £ sign is crossed out
					Total 8 marks