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EDEXCEL INTERNATIONAL GCSE MATHS: QUESTIONS BY TOPIC

Algebraic Manipulation (A1)

International GCSE Mathematics A (4MA1) · Foundation tier

122 questions · 675 marks · Mark schemes included

Past papers June 2018 - June 2025 · 6 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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A1d ALGEBRAIC FRACTIONS & IDENTITIES

No questions on this sub-topic in the available past papers.

A1e ALGEBRAIC PROOF & REASONING

No questions on this sub-topic in the available past papers.

A1f FUNCTIONS (COMPOSITE & INVERSE)

No questions on this sub-topic in the available past papers.

QUESTIONS

122 questions · 675 marks · 3 sub-topics

SUB-TOPIC A1a

NOTATION, SIMPLIFYING & SUBSTITUTION

Sub-topic A1a · 74 questions · 384 marks · lowest tariff first

5 (a) Simplify $10a \times b$

.....

(1)

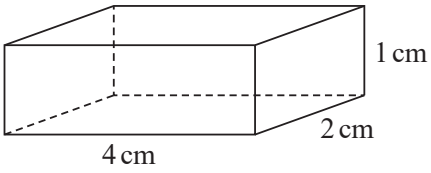
(b) Solve $n + 3 = 7$

$n =$ .....

(1)

(Total for Question 5 is 2 marks)

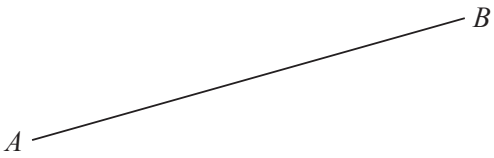
6 (a) Write down the mathematical name of this 3-D shape.



.....

(1)

(b)



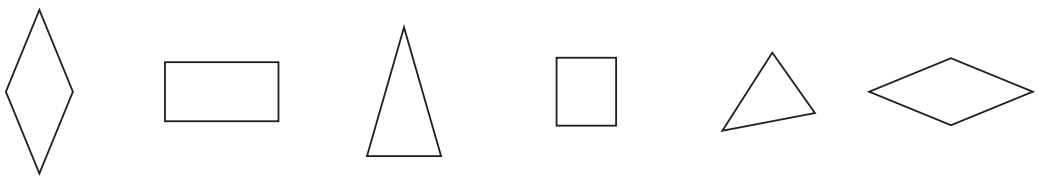
Measure the length of AB.

..... cm

(1)

Here are six shapes.

A **B** **C** **D** **E** **F**



Two of these shapes are congruent.

(c) Write down the letters of these two shapes.

..... and .....

(1)

(Total for Question 6 is 3 marks)

2 (a) Write these numbers in order of size.
Start with the smallest number.

2.12 2.19 2.07 2.1 2.001

.....

(1)

(b) Write down the value of 6 in the number 54.623

.....

(1)

(c) Write the number 3.4896 correct to 2 decimal places.

.....

(1)

(d) Write 0.6 as a percentage.

.....%

(1)

(Total for Question 2 is 4 marks)

3 (a) Simplify $4x + 5x - 2x$

.....

(1)

(b) Simplify $4p \times 7$

.....

(1)

(Total for Question 3 is 2 marks)

4 (a) Simplify $4 \times 5e$

.....

(1)

(b) Solve $f + 14 = 29$

$f =$ .....

(1)

(Total for Question 4 is 2 marks)

5 (a) Write 0.6 as a percentage.

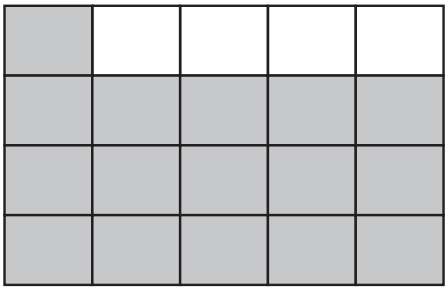
..... %

(1)

(b) Write $\frac{19}{100}$ as a decimal.

.....

(1)



(c) What fraction of this shape is shaded?
Write your fraction in its simplest form.

.....

(2)

(Total for Question 5 is 4 marks)

6 Here is a number machine.



(a) Find the output when the input is 10

.....

(1)

(b) Find the output when the input is −2

.....

(1)

(Total for Question 6 is 2 marks)

7 Raymond sells 80 burgers for a total of £176

$\frac{1}{5}$ of the burgers are large.

Each large burger costs £3

The remaining burgers are small.

Work out the cost of one small burger.

£.....

(Total for Question 7 is 4 marks)

8 (a) Simplify $y \times y \times y$

.....

(1)

(b) Simplify $3c \times 2d$

.....

(1)

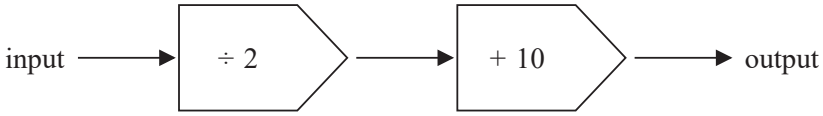
(c) Simplify $2k - 4k + 3k$

.....

(1)

(Total for Question 8 is 3 marks)

7 Here is a number machine.



(a) Work out the output when the input is 8

(1)

(b) Work out the input when the output is 120

(2)

(Total for Question 7 is 3 marks)

8 A train journey started at 17 50 and finished at 02 25 the next day.

How long did the train journey take?
Give your answer in hours and minutes.

hours minutes

(Total for Question 8 is 2 marks)

12 Three bags, **A**, **B** and **C**, each contain some marbles.



There is a total of 75 marbles in the three bags.

$\frac{1}{5}$ of the marbles are in bag **A**.

There are 4 more marbles in bag **B** than in bag **C**.

Work out the number of marbles in each bag.

Bag **A** .....

Bag **B** .....

Bag **C** .....

(Total for Question 12 is 3 marks)

13 Potatoes cost 2 dollars per kg.
Carrots cost 3 dollars per kg.

Alfred buys p kg of potatoes and c kg of carrots.
The total cost is T dollars.

Write down a formula for T in terms of p and c.

.....

(Total for Question 13 is 3 marks)

7 (a) Write the ratio 42 : 96 in its simplest form.

.....

(2)

There are only apples and pears in a fruit basket so that

the number of apples : the number of pears = 4 : 11

(b) What fraction of the fruit in the basket is pears?

.....

(1)

(Total for Question 7 is 3 marks)

8 Danielle is going to print some business cards.

She uses this rule to work out the total cost, in euros, of printing the business cards.

Total cost = price per card × number of cards + fixed fee

price per card = 0.14 euros
fixed fee = 25 euros

Danielle is going to print 350 business cards.

Work out the total cost of printing the business cards.

..... euros

(Total for Question 8 is 3 marks)

2 (a) Simplify $12a + 3a - 7a$

.....

(1)

(b) Simplify $8 \times 3b$

.....

(1)

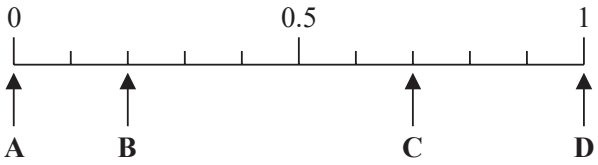
(c) Solve $\frac{c}{3} = 9$

$c =$ .....

(1)

(Total for Question 2 is 3 marks)

3 Here is a probability scale.



In a fruit bowl, there are only

3 bananas
7 pears

Shimon is going to take at random one of the fruits from the bowl.

(a) Write down the letter of the arrow that points to the probability that Shimon takes

(i) a pear,

.....

(1)

(ii) a grape.

.....

(1)

Emma has some carrots, some potatoes and some onions in a bag.
She says that the probability of taking at random a carrot from the bag is 1.4

Emma is not correct.

(b) Explain why.

.....

.....

(1)

(Total for Question 3 is 3 marks)

17 Molly uses this number machine to work out the amount of tax that she has to pay on the money she earns.



When Molly works n hours the amount of tax she has to pay is £T

Find a formula for T in terms of n

.....

(Total for Question 17 is 3 marks)

17 Here is a list of six numbers written in order of size.

x 5 y z 10 12

The numbers have
a range of 9
a median of 8
a mode of 10

Find the value of x, the value of y and the value of z

$x =$ .....

$y =$ .....

$z =$ .....

(Total for Question 17 is 3 marks)

18 (a) Simplify $w^{12} \div w^3$

.....

(1)

(b) Simplify $5m^4p^2 \times 2m^3p$

.....

(2)

(Total for Question 18 is 3 marks)

14 A small bag of grain contains 2 kg of grain.
A large sack of grain contains 7 kg of grain.

Makenna buys r small bags of grain and h large sacks of grain.

The total amount of grain Makenna buys is F kg.

Write down a formula for F in terms of r and h

.....

(Total for Question 14 is 3 marks)

15 Show that $\frac{3}{5} + \frac{2}{7} = \frac{31}{35}$

(Total for Question 15 is 2 marks)

2 (a) Simplify $10p - 4p + 9p$

.....

(1)

(b) Simplify $9 \times 4q$

.....

(1)

(c) Solve $4r = 15$

$r =$ .....

(1)

(Total for Question 2 is 3 marks)

13 Kye has some toy cars.

He has n red cars.
He has twice as many blue cars as red cars.
He has 7 more green cars than red cars.

(a) Write an expression, in terms of n, for the total number of red cars, blue cars and green cars that Kye has.
Write your answer in its simplest form.

.....

(2)

The total number of cars that Kye has is T

(b) Write an expression, in terms of T and n, for the number of cars that Kye has that are **not** red cars, blue cars or green cars.

.....

(1)

(Total for Question 13 is 3 marks)

10 Lui is asked to work out the value of $30 - 4x$ when $x = -5$

Here is his working and his answer.

$$30 - 4x = 30 - 4 \times -5$$
$$= 30 - 20$$
$$= 10$$

Lui's answer is wrong.

(a) Explain what Lui has done wrong in his working.

.....

.....

(1)

Oni thinks of a number.
She calls the number Y

Y is a **positive**, **odd** number and $Y \leqslant 9$

(b) Write down all the possible values of Y

.....

(2)

(Total for Question 10 is 3 marks)

4 (a) Change 5000 millilitres into litres.

..... litres

(1)

(b) Find the difference between a length of 3 metres and a length of 85 centimetres.
Give your answer in centimetres.

..... centimetres

(2)

(Total for Question 4 is 3 marks)

5 (a) Simplify $a + a + a + a + a$

.....

(1)

(b) Simplify $b \times c \times 7$

.....

(1)

(c) Solve $5d = 40$

$d =$ .....

(1)

(Total for Question 5 is 3 marks)

14 $y = c - dx$

$c = 15$
$d = 8$
$x = -4$

(a) Work out the value of y.

$y =$ .....

(2)

$t = 4(p - q)$

$t = 18$
$q = 6$

(b) Work out the value of p.

$p =$ .....

(2)

(Total for Question 14 is 4 marks)

9 $h = 6q - 2u$

(a) Work out the value of h when $q = 3$ and $u = -5$

$h =$

(2)

$B = 3m + 2p$

(b) Work out the value of p when $B = 2$ and $m = 5$

$p =$

(2)

(Total for Question 9 is 4 marks)

7 Juan and Gabriella and their two children are going on a train journey from Madrid.

The cost of an adult ticket for this train journey is 53.50 euros.
The cost of a child ticket for this train journey is 60% of the cost of the adult ticket.

Juan buys 2 adult tickets and 2 child tickets.
He pays with two 100 euro notes.

How much change should he get?

euros

(Total for Question 7 is 4 marks)

8 (a) Simplify $5x + 4y - x - y$

(2)

(b) Solve $2t + 3 = 12$

$t =$

(2)

(Total for Question 8 is 4 marks)

3 Mike buys 150 burger buns.

He buys the burger buns in packs of 6 burger buns.
Each pack of 6 burger buns costs £1.03

Work out how much Mike pays for the 150 burger buns.

£

(Total for Question 3 is 3 marks)

4 (a) Simplify $4m + 2m - m$

(1)

(b) Simplify $5p \times 7$

(1)

(c) Solve $8g = 40$

$g =$

(1)

(d) Solve $19 - k = 4$

$k =$

(1)

(Total for Question 4 is 4 marks)

7 (a) Complete the number machine by writing the correct output on the dotted line.



(1)

(b) Complete the number machine by writing the correct input on the dotted line.



(2)

Here is an incomplete number machine.



(c) Complete the number machine.

(1)

(Total for Question 7 is 4 marks)

17 Three tins, A, B and C, each contain buttons.

Tin A contains x buttons.
Tin B contains 4 times the number of buttons that tin A contains.
Tin C contains 7 fewer buttons than tin A.

The total number of buttons in the three tins is 137

Work out the number of buttons in tin C.

.....

(Total for Question 17 is 4 marks)

18 (a) Expand $e(3e - 5)$

.....

(1)

(b) Factorise $35 + 5f$

.....

(1)

(c) Simplify $(4pq^2)^3$

.....

(2)

(Total for Question 18 is 4 marks)

6 Nav makes bracelets using cord.

Nav has a 6 metre length of cord.
Each bracelet needs 17.5 cm of cord.

Work out the greatest number of bracelets that Nav can make.

.....

(Total for Question 6 is 3 marks)

7 (a) Simplify $10x + 4y + 3x - 6y$

.....

(2)

(b) Solve $2n + 5 = 16$

$n =$ .....

(2)

(Total for Question 7 is 4 marks)

8 (a) Simplify $a \times a \times a \times a$

.....

(1)

(b) Simplify $4b \times 5c$

.....

(1)

(c) Simplify $6d + 2e + d - 5e$

.....

(2)

(Total for Question 8 is 4 marks)

9 Sabbir has some boxes of bananas and some sacks of tomatoes.
The weight of each box of bananas is the same and the weight of each sack of tomatoes is the same.

The weight of 3 boxes of bananas is 42 kg.
The weight of 8 sacks of tomatoes is 68 kg.

Work out the total weight of 9 boxes of bananas and 15 sacks of tomatoes.

..... kg

(Total for Question 9 is 3 marks)

3 Find the number that is exactly halfway between 3.7 and 6.1

.....

(Total for Question 3 is 2 marks)

4 (a) Simplify $3 \times 10d$

.....

(1)

(b) Simplify $8e + e - 5e$

.....

(1)

(c) Solve $6g = 42$

$g =$ .....

(1)

(d) Solve $24 = 10 + h$

$h =$ .....

(1)

(Total for Question 4 is 4 marks)

8 Masie is told that $13\,203 \div 27 = 489$

Explain how she can use this calculation to work out 489×28

.....

.....

.....

(Total for Question 8 is 2 marks)

9 (a) Simplify $6p + 2t + p - 3t$

.....

(2)

$A = 8x - 3y$

(b) Work out the value of A when $x = 5$ and $y = 4$

$A =$ .....

(2)

(Total for Question 9 is 4 marks)

10 Here is a number machine.



When the input is 7 the output is 60

(a) Work out the value of y

$y =$ .....

(2)

Here is a different number machine.



The input is x

(b) Write down an expression, in terms of x, for the output.

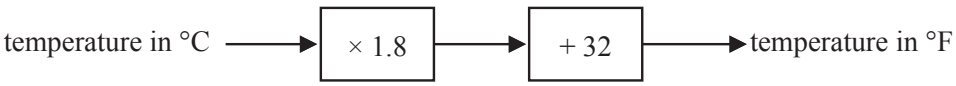
.....

(2)

(Total for Question 10 is 4 marks)

10 Charlene is comparing cooking temperatures in degrees Celsius (°C) with cooking temperatures in degrees Fahrenheit (°F)

She finds this rule to change from °C to °F



(a) Change a temperature of 175°C to a temperature in °F

..... °F

(2)

(b) Change a temperature of 482°F to a temperature in °C

..... °C

(2)

(Total for Question 10 is 4 marks)

6 Here is a number machine.



(a) Work out the output when the input is 18

.....

(1)

(b) Work out the input when the output is 20

.....

(2)

Here is a different number machine.



For this number machine, when the input is 8 the output is 50

(c) Work out the value of x.

$x =$ .....

(2)

(Total for Question 6 is 5 marks)

5 There are 12 481 people at a concert.
8906 of these people are adults.
The rest of the people are children.

$\frac{3}{5}$ of the children are boys.

Work out the number of girls at the concert.

.....

(Total for Question 5 is 4 marks)

6 (a) Simplify $6e \times 2f$

.....

(1)

(b) Simplify $5m + 7k - 2m + k$

.....

(2)

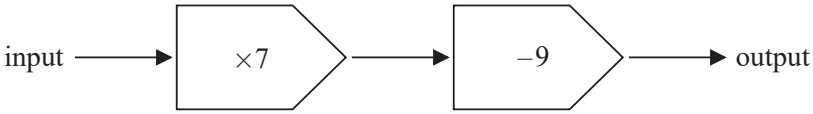
(c) Solve $5y + 3 = 14$

$y =$ .....

(2)

(Total for Question 6 is 5 marks)

10 Here is a number machine.



(a) Work out the output when the input is 8

.....

(1)

(b) Work out the input when the output is 82

.....

(2)

The input is y.

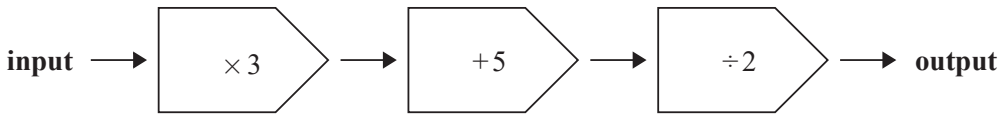
(c) Find an expression, in terms of y, for the output.

.....

(2)

(Total for Question 10 is 5 marks)

5 Here is a number machine.



(a) Work out the output when the input is 7

.....

(1)

(b) Work out the input when the output is 160

.....

(2)

When the input is n, the output is P.

(c) Find a formula for P in terms of n.

.....

(2)

(Total for Question 5 is 5 marks)

7 (a) Solve $5x = 30$

$x =$ .....

(1)

(b) Solve $y - 7 = 12$

$y =$ .....

(1)

(c) Simplify $h + h + h + h + h$

.....

(1)

(d) Simplify $5a + 7f - 2a + 4f$

.....

(2)

(Total for Question 7 is 5 marks)

8 Mairi has a 2 metre length of string.
She cuts from the string as many lengths of 35 centimetres as possible.

Work out the length of string that she has left.
Give your answer in centimetres.

..... cm

(Total for Question 8 is 3 marks)

Rita has some beads in a bag.

Of these beads, Rita gives

$\frac{1}{2}$ to Sheng

and $\frac{2}{5}$ to Tusco

Rita now has 3 beads left in the bag.

(e) Work out how many beads Rita originally had in the bag.

.....

(3)

(Total for Question 6 is 8 marks)

7 (a) Simplify $3c + 5d - c + 2d$

.....

(2)

(b) Simplify $8e \times 5f$

.....

(1)

(c) Solve $5r - 3 = 8$

$r =$ .....

(2)

(Total for Question 7 is 5 marks)

14 Jakub has bought a chicken.

He is going to use this rule to work out the number of minutes it will take to cook his chicken.

Cooking time (minutes)

Multiply the chicken's weight, in kg, by 40
Then add
30

The weight of Jakub's chicken is 2.6 kg

(a) Use the rule to work out the number of minutes it will take to cook Jakub's chicken.

..... minutes
(2)

The following week Jakub buys another chicken.

He uses the rule and works out that it will take 2 hours 40 minutes to cook this chicken.

(b) Work out the weight of this chicken.

..... kg
(3)

(Total for Question 14 is 5 marks)

9 (a) Simplify $a \times a \times a \times a \times a$

.....

(1)

(b) Simplify $8b \times 3c$

.....

(1)

(c) Expand $3(x + 4)$

.....

(1)

$Q = 5v^2 - w$

(d) Work out the value of Q when $v = \frac{1}{2}$ and $w = \frac{1}{4}$

$Q =$ .....

(2)

(Total for Question 9 is 5 marks)

7 (a) Simplify $5p \times 9k$

.....

(1)

(b) Simplify $3e + 2f + 8e - 7f$

.....

(2)

(c) Solve $2d + 7 = 16$

$d =$ .....

(2)

(Total for Question 7 is 5 marks)

12 Aarav uses this rule to estimate the time, in minutes, that a bus journey takes.

Time	=	2.5 × length of journey in kilometres	+	1.5 × number of bus stops

Aarav's bus journey to work has a length of 12 kilometres.
There are 5 bus stops on the route.

(a) Use Aarav's rule to work out an estimate for the time this bus journey takes.

..... minutes
(2)

A different bus journey takes 55 minutes.
There are 8 bus stops on the route.

(b) Use Aarav's rule to work out an estimate for the distance of this bus journey.

..... km
(3)

(Total for Question 12 is 5 marks)

6 (a) Write 5 15 pm using the 24-hour clock.

.....

(1)

Roberta goes out for a walk.
She leaves home at 16 35
She arrives back home at 20 15 on the same day.

(b) Work out for how much time Roberta is out for her walk.

..... hours ..... minutes

(2)

(Total for Question 6 is 3 marks)

7 (a) Simplify $c \times c \times c \times c \times c$

.....

(1)

(b) Solve $5 + x = 12$

$x =$ .....

(1)

(c) Solve $\frac{y}{6} = 3$

$y =$ .....

(1)

(d) Expand $5(2 + 3h)$

.....

(1)

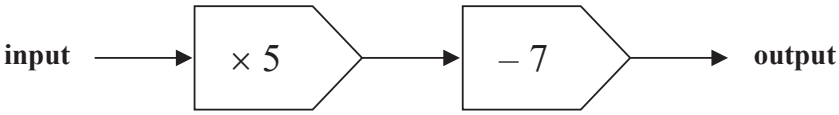
(e) Factorise $g^2 + 7g$

.....

(1)

(Total for Question 7 is 5 marks)

8 Here is a number machine.

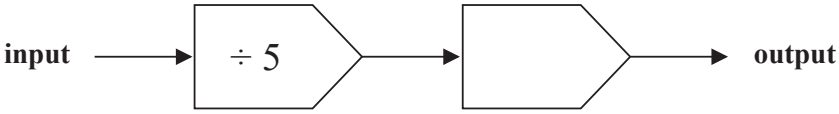


(a) Work out the output when the input is 9

.....

(1)

Here is a different number machine.



When the input is 30 the output is 18

(b) Find a suitable way to complete the number machine.

(1)

The following rule is used to work out the total cost, in euros, of hiring a cement mixer.

Total cost = 8 euros per day plus 5 euros

James hires a cement mixer for 3 days.

(c) Work out the cost to James of hiring the cement mixer.

..... euros

(1)

The cost to Sophia of hiring a cement mixer is 61 euros.

(d) For how many days does Sophia hire the cement mixer?

..... days

(2)

(Total for Question 8 is 5 marks)

7 (a) Simplify $6a \times 2c$

.....

(1)

(b) Simplify $4d + 3e + d - 5e$

.....

(2)

(c) Solve $4x - 7 = 23$

$x =$ .....

(2)

(Total for Question 7 is 5 marks)

8 (a) Write down the prime number that lies between 90 and 100

.....

(1)

(b) Find the cube root of 79 507

.....

(1)

(c) Work out the value of $4^2 \times 5^3$

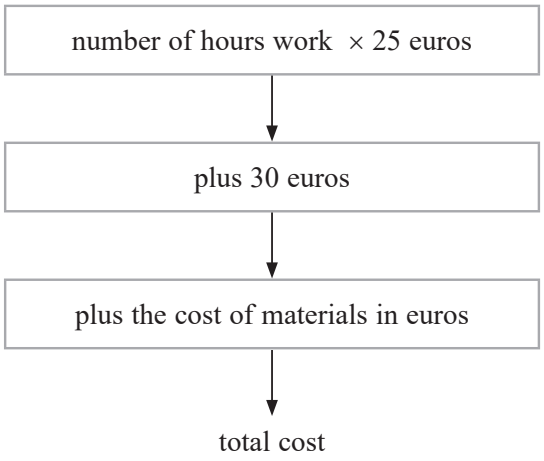
.....

(2)

(Total for Question 8 is 4 marks)

8 Georgia is a plumber.

She uses this rule to work out the total cost, in euros, of her customers' bills.



Georgia does some plumbing work for Tallulah.

She works for 3 hours.
The cost of the materials she uses is 42 euros.

(a) Work out the total cost of Tallulah's bill.

..... euros
(2)

Georgia also does some plumbing work for Sam.

The cost of the materials she uses is 65 euros.
The total cost of Sam's bill is 220 euros.

(b) Work out the number of hours that Georgia works for Sam.

..... hours
(3)

(Total for Question 8 is 5 marks)

3 (a) Simplify $d + d + d + d$

.....

(1)

(b) Simplify $w \times w \times w \times w \times w$

.....

(1)

(c) Solve $6x = 42$

$x =$.....

(1)

(d) Simplify $7r + 9y + 3r - 4y$

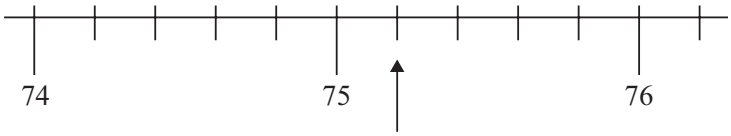
.....

(2)

(Total for Question 3 is 5 marks)

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4 The diagram shows a number line.

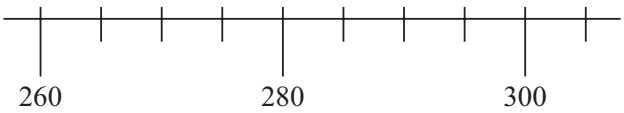


(a) Write down the number marked with the arrow.

.....

(1)

(b) On the number line below, mark with an arrow (↑) the number 265



(1)

(Total for Question 4 is 2 marks)

5 (a) Simplify $6x + 8x - 3x$

.....

(1)

(b) Simplify $4e \times 5f$

.....

(1)

(c) Solve $8p = 24$

$p =$ .....

(1)

(d) Solve $k - 4 = 13$

$k =$ .....

(1)

(e) Simplify $10t + 4d - 3t + 2d$

.....

(2)

(Total for Question 5 is 6 marks)

11 (a) Factorise $3x^2 - x$

(1)

(b) Expand $4(2y + 3)$

(1)

$C = 5a + 4d$

(c) Work out the value of C when $a = -3$ and $d = 6$

$C =$

(2)

$P = 3t^2 + 7t$

(d) Work out the value of P when $t = -4$

$P =$

(2)

(Total for Question 11 is 6 marks)

7 (a) Simplify $5c \times d$

.....

(1)

(b) Solve $x + 5 = 12$

$x =$ .....

(1)

(c) Solve $9y = 36$

$y =$ .....

(1)

(d) Simplify $8k + 5m - 2k + 6m$

.....

(2)

(e) Expand $4(3g + 1)$

.....

(1)

(Total for Question 7 is 6 marks)

12 This formula can be used to work out the cost, in riyals, of hiring a bicycle in Qatar for a number of days.

Cost = 65 × number of days + 44

Ghalia hired a bicycle in Qatar for 14 days.

(a) Work out the cost.

..... riyals

(2)

This formula can be used to work out the cost, in riyals, of hiring a helmet in Qatar for a number of days.

Cost = 12.5 × number of days

Kasun wants to hire a bicycle and a helmet for the same number of days.
He wants to hire them for as many days as he can.
He has 750 riyals to spend.

(b) Work out how much of the 750 riyals is not spent.

..... riyals

(4)

(Total for Question 12 is 6 marks)

Aaron cycled along a straight path from his house to Bharat's house.
The scale of the map is 1 cm represents 5 km.

(d) Work out the distance, in kilometres, that Aaron cycled.

..... km
(1)

Aaron left his house at 10 45 am and arrived at Bharat's house at 1 05 pm.

(e) How long did Aaron's cycle ride take him?
Give your answer in hours and minutes.

..... hours ..... minutes
(2)

(Total for Question 6 is 7 marks)

7 (a) Solve $5x = 20$

$x =$ .....
(1)

(b) Simplify $3a \times 8b$

.....
(1)

(c) Simplify $8w - 4y + w - 3y$

.....
(2)

(d) Factorise fully $16 + 12t$

.....
(2)

(Total for Question 7 is 6 marks)

16 (a) Simplify $a^7 \times a^4$

.....

(1)

(b) Simplify $w^{15} \div w^3$

.....

(1)

(c) Simplify $(8x^5y^3)^2$

.....

(2)

(d) Make t the subject of $c = t^3 - 8v$

.....

(2)

(Total for Question 16 is 6 marks)

15 (a) Solve $5c = 15$

$c =$ .....

(1)

(b) Expand $x(8 - x)$

.....

(1)

$T = 5m - 6n$

(c) Work out the value of T when $m = 4.2$ and $n = -2.5$

$T =$ .....

(2)

(d) Make g the subject of $k = 2g + t$

.....

(2)

(Total for Question 15 is 6 marks)

8 (a) Simplify $12g - 8e - 5g + 6e$

.....

(2)

$A = 3b - 5c$

(b) Work out the value of A when $b = 12$ and $c = 4$

$A =$ .....

(2)

(c) Solve $4p + 9 = 24$

$p =$ .....

(2)

(Total for Question 8 is 6 marks)

4 (a) Simplify $10y - y$

.....

(1)

(b) Simplify $3p \times 4p$

.....

(1)

(c) Solve $7x = 42$

$x =$ .....

(1)

(d) Solve $n + 6 = 5$

$n =$ .....

(1)

(e) Simplify $8c + 5d - 2c - 3d$

.....

(2)

(Total for Question 4 is 6 marks)

5 (a) Simplify $p + p + p + p$

.....

(1)

(b) Simplify $5e + 6f + 7e - 2f$

.....

(2)

(c) Solve $13 - x = 7$

$x =$ .....

(1)

(d) Solve $4y + 7 = 43$

$y =$ .....

(2)

(Total for Question 5 is 6 marks)

8 (a) Simplify $10x - 7y - 6x + 4y$

.....

(2)

$T = 4d - 6e$

(b) Work out the value of T when $d = 13$ and $e = 7$

$T =$ .....

(2)

(c) Solve $5p + 11 = 28$

$p =$ .....

(2)

(Total for Question 8 is 6 marks)

13 (a) Solve $7x + 3 = x - 18$

$x =$

(2)

(b) Make w the subject of $t = 7w + 3$

(2)

Pencils cost 2 dollars each.
Rulers cost 3 dollars each.

Edith buys p pencils and r rulers.
The total cost is T dollars.

(c) Write down a formula for T in terms of p and r.

(3)

(Total for Question 13 is 7 marks)

8 (a) Simplify $6m - 2k + 5m - k$

.....

(2)

$P = 2a + 3b$

(b) Work out the value of P when $a = 5$ and $b = 8$

$P =$ .....

(2)

$P = 2a + 3b$

(c) Work out the value of a when $P = 16$ and $b = 20$

$a =$ .....

(3)

(Total for Question 8 is 7 marks)

6 (a) Simplify $3r \times 5t$

.....

(1)

(b) Solve $4x + 5 = 27$

$x =$ .....

(2)

$P = 7w - 5y$

(c) Find the value of P when $w = 2$ and $y = 4$

$P =$ .....

(2)

$Q = 2u^2 - 5$

(d) Find the value of Q when $u = -3$

$Q =$ .....

(2)

(Total for Question 6 is 7 marks)

9 $c = 4$
$d = 7$

(a) Work out the value of $3c + 2d$

.....

(2)

$p = -6$
$m = -2$

(b) Work out the value of $2p^2 + 3m$

.....

(2)

There are 6 eggs in a small box of eggs.
There are 12 eggs in a large box of eggs.

Alex buys g small boxes of eggs and h large boxes of eggs.
He buys a total of T eggs.

(c) Write down a formula for T in terms of g and h.

.....

(3)

(Total for Question 9 is 7 marks)

8 The following rule is used to work out the total cost, in euros, of hiring a room.

Total cost = 9 euros for each hour plus 20 euros

Paolo hires the room for 5 hours.

(a) Work out the total cost.

..... euros

(2)

Agathe also hires the room.
The total cost is 164 euros.

(b) For how many hours does Agathe hire the room?

..... hours

(3)

The total cost of hiring the room for n hours is T euros.

(c) Write down a formula for T in terms of n.

.....

(2)

(Total for Question 8 is 7 marks)

8 (a) Simplify $w \times w \times w \times w \times w$

.....

(1)

(b) Simplify $5a \times 3c$

.....

(1)

(c) Simplify $3e + 2f - e + 5f$

.....

(2)

(d) Solve $5x - 7 = x + 12$
Show clear algebraic working.

$x =$ .....

(3)

(Total for Question 8 is 7 marks)

11 (a) Simplify $c \times c \times c \times c \times c \times c$

.....

(1)

(b) Simplify $2h^3 + 5h^3 - h^3$

.....

(1)

(c) Expand $x(x + 5)$

.....

(1)

(d) Factorise $9y - 12$

.....

(1)

Rosanna sells m small bags of marbles and p large bags of marbles.

Each small bag contains 15 marbles.
Each large bag contains 40 marbles.

The total number of marbles that Rosanna sells is T

(e) Write down a formula for T in terms of m and p

.....

(3)

(Total for Question 11 is 7 marks)

24 (a) Write down the value of $(m + 2)^0$ where m is a positive integer.

.....

(1)

(b) Simplify $(3a^2b^4)^3$

.....

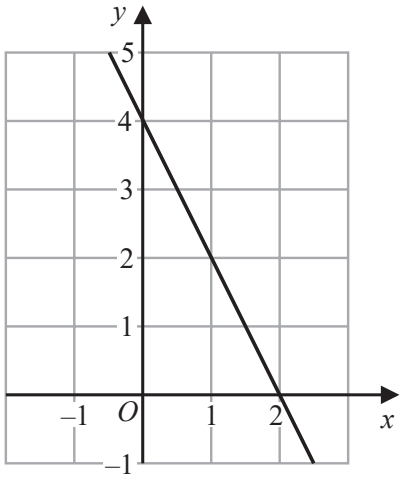
(2)

(c) Factorise fully $14x^2y^4 + 21x^3y^2$

.....

(2)

The diagram shows a straight line drawn on a grid.



(d) Write down an equation of the line.

.....

(2)

(Total for Question 24 is 7 marks)

7 (a) Simplify $9d \times 5c$

.....

(1)

(b) Simplify $7p + 5n - 9p + 3n$

.....

(2)

$T = 8e - 6f$

(c) Work out the value of T when $e = 9$ and $f = 5$

$T =$ .....

(2)

(d) Solve $5m - 6 = 17$

$m =$ .....

(2)

(Total for Question 7 is 7 marks)

5 (a) Simplify $8d - 4d + 7d$

.....

(1)

(b) Simplify $m \times 10p$

.....

(1)

(c) Solve $x + 5 = -19$

$x =$ .....

(1)

(d) Solve $\frac{y}{8} = 6$

$y =$ .....

(1)

(e) Simplify $a \times a \times a \times a$

.....

(1)

$k = 8$ and $n = 12$

(f) Work out the value of $9k - 4n$

.....

(2)

(Total for Question 5 is 7 marks)

5 (a) Simplify $4e \times 7f$

.....

(1)

(b) Simplify $d \times d \times d \times d \times d$

.....

(1)

(c) Simplify $3a + 2k + a - 7k$

.....

(2)

(d) Solve $x + 6 = 15$

$x =$ .....

(1)

(e) Solve $2r - 9 = 14$

$r =$ .....

(2)

(Total for Question 5 is 7 marks)

13 (a) Factorise $15 - 5x$

.....

(1)

$d = 5p + 7r$

(b) Work out the value of p when $d = 35$ and $r = 2$

$p =$ .....

(3)

Sweets are sold in small packets and large packets.

There are 12 sweets in a small packet.
There are 25 sweets in a large packet.

Ben buys m small packets of sweets and n large packets of sweets.

(c) (i) Write an expression, in terms of m and n, for the total number of packets of sweets Ben buys.

.....

(1)

(ii) Write an expression, in terms of m and n, for the total number of sweets Ben buys.

.....

(2)

(Total for Question 13 is 7 marks)

8 (a) Simplify $a + a + a + a$

.....

(1)

(b) Simplify $3c \times 5c$

.....

(1)

(c) Simplify $3e + 7g + 5e - 4g$

.....

(2)

(d) Solve $x - 9 = 14$

$x =$ .....

(1)

(e) Factorise $5y + 15$

.....

(1)

(f) Make y the subject of $H = 3y - w$

.....

(2)

(Total for Question 8 is 8 marks)

9 Simon has x sweets.
Yuen has 2 more sweets than Simon.
Giulia has 3 times as many sweets as Yuen.

Simon, Yuen and Giulia have a total of T sweets.

(a) Write down a formula for T in terms of x.
Give your formula in its simplest form.

.....

(3)

(b) Make g the subject of the formula $r = 4g + 7$

.....

(2)

(c) Solve $6y - 3 = 2y + 8$
Show clear algebraic working.

$y =$ .....

(3)

(Total for Question 9 is 8 marks)

7 (a) Simplify $p + p + p + p + p + p$

.....

(1)

(b) Simplify $5y^2 + 6y^2 - 3y^2$

.....

(1)

(c) Simplify $e \times e \times e \times e \times e$

.....

(1)

(d) Simplify $5c \times 4d$

.....

(1)

(e) Solve $x - 7 = 19$

$x =$ .....

(1)

$18^2 + 15^2 - 5^3 = 4n$

(f) Work out the value of n.

$n =$ .....

(2)

(g) Factorise $9t - 6$

.....

(1)

(Total for Question 7 is 8 marks)

11 (a) Simplify $c + c + c + c + c$

.....

(1)

(b) Simplify $7w + 10y - 9w + 2y$

.....

(2)

The nth term of a sequence is given by $7n - 4$

(c) Find the 1st term and the 5th term of the sequence.

1st term .....

5th term .....

(2)

(d) Solve $7(x + 5) = 8 - 3x$
Show clear algebraic working.

$x =$ .....

(3)

(Total for Question 11 is 8 marks)

11 (a) Simplify $e \times e \times e \times e \times e$

.....

(1)

(b) Simplify $m + m + m$

.....

(1)

(c) Simplify $3g^2 + 7g^2 - 4g^2$

.....

(1)

(d) Expand $a(a + 8)$

.....

(1)

(e) Factorise $15x + 20$

.....

(1)

Sophia sells d packs of toy cars and h boxes of toy cars.

Each pack contains 3 toy cars.
Each box contains 5 toy cars.

The total number of toy cars that Sophia sells is T

(f) Write down a formula for T in terms of d and h

.....

(3)

(Total for Question 11 is 8 marks)

8 Barsha buys some nails and some bolts.

Each box of nails costs £2.60
Each pack of bolts costs £3.94

Barsha buys 5 boxes of nails and 4 packs of bolts.
He pays with a £50 note.

Work out how much change he should get.

£.....

(Total for Question 8 is 3 marks)

9 (a) Simplify $c \times c \times c$

.....

(1)

(b) Simplify $12d \times 3e$

.....

(1)

(c) Solve $\frac{k}{4} = 7$

$k =$ .....

(1)

(d) Solve $2g - 3 = 6$

$g =$ .....

(2)

(e) Expand $x(x - 4)$

.....

(1)

$P = 4y^2 + w$

(f) Work out the value of P when $y = -3$ and $w = 2$

$P =$ .....

(2)

(Total for Question 9 is 8 marks)

16 (a) Factorise $6y - 27$

.....

(1)

(b) Expand $p(p - 2)$

.....

(1)

$T = 5g + 4r$

(c) Work out the value of r when $T = 46$ and $g = 17$

$r =$ .....

(3)

$P = m^2 - 4c$

(d) Work out the value of P when $m = -5$ and $c = 3$

$P =$ .....

(2)

(e) Expand and simplify $(x + 5)(x - 7)$

.....

(2)

(Total for Question 16 is 9 marks)

7 One weekend, Marion went on four walks.

Here are the distances Marion walked

3.5	kilometres
950	metres
1.8	kilometres
1200	metres

The same weekend, Talha walked a total of 8 kilometres.

Talha walked a greater distance than Marion walked.

How much greater?
Give your answer in metres.

..... metres

(Total for Question 7 is 4 marks)

8 (a) Simplify $7g + 3h + 4g - 5h$

.....

(2)

(b) Simplify $7a \times 4m$

.....

(1)

(c) Solve $5x - 7 = 12$

$x =$ .....

(2)

(d) Expand $5(7k + 3)$

.....

(1)

(e) Factorise $9y + 12$

.....

(1)

Max has c counters.
Bulan has 3 times as many counters as Max.
Chanda has 7 more counters than Max.

(f) Write an expression, in terms of c, for the total number of counters that Max, Bulan and Chanda have.
Simplify your answer.

.....

(3)

(Total for Question 8 is 10 marks)

SUB-TOPIC A1b

EXPANDING & FACTORISING

Sub-topic A1b · 35 questions · 216 marks · lowest tariff first

13 (a) Simplify $e^8 \div e^2$

.....

(1)

(b) Expand and simplify $(x - 3)(x + 1)$

.....

(2)

(Total for Question 13 is 3 marks)

14 Here is a right-angled triangle.

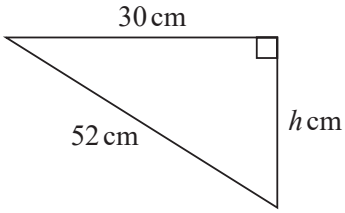


Diagram **NOT** accurately drawn

Calculate the value of h.
Give your answer correct to 3 significant figures.

h = ...

(Total for Question 14 is 3 marks)

23 (a) Expand $4x(x - 5)$

.....

(1)

(b) Factorise $y^2 - 9y + 20$

.....

(2)

(Total for Question 23 is 3 marks)

24 (a) Write 5.6×10^{-3} as an ordinary number.

.....

(1)

(b) Work out $\dfrac{6 \times 10^3}{2.1 \times 10^{-4} + 9 \times 10^{-5}}$

Give your answer in standard form.

.....

(2)

(Total for Question 24 is 3 marks)

25 (a) Factorise fully $12d^2e + 16d^2e^2$

(2)

(b) Simplify fully $\dfrac{15k^4m^3}{5km^2}$

(2)

(Total for Question 25 is 4 marks)

TOTAL FOR PAPER IS 100 MARKS

17 Three tins, A, B and C, each contain buttons.

Tin A contains x buttons.
Tin B contains 4 times the number of buttons that tin A contains.
Tin C contains 7 fewer buttons than tin A.

The total number of buttons in the three tins is 137

Work out the number of buttons in tin C.

.....

(Total for Question 17 is 4 marks)

18 (a) Expand $e(3e - 5)$

.....

(1)

(b) Factorise $35 + 5f$

.....

(1)

(c) Simplify $(4pq^2)^3$

.....

(2)

(Total for Question 18 is 4 marks)

13 (a) Factorise $6x - 15$

.....

(1)

There are 200 bolts in each box of bolts.
Samira buys c boxes of bolts.

Samira uses the bolts she bought to fill packets of bolts.
There are 50 bolts in each packet of bolts.
Samira sells d packets of bolts.

The total number of bolts Samira has left is T

(b) Write down a formula for T in terms of c and d

.....

(3)

(Total for Question 13 is 4 marks)

14 Work out the value of $\sqrt{7.4} + \frac{5.1^2}{3}$

Write down all the figures on your calculator display.

.....

(Total for Question 14 is 2 marks)

7 (a) Write $7 \times 7 \times 7 \times 7 \times 7$ as a power of 7

.....

(1)

(b) Show that 64 is both a square number and a cube number.

(2)

(c) Find the value of 11^3

.....

(1)

(d) Find the value of $\sqrt{98.01}$

.....

(1)

(Total for Question 7 is 5 marks)

8 (a) Find the value of $25 - 4g$ when $g = -3$

.....

(2)

(b) Expand and simplify $x(2x + 1) + 3(x - 2) + 7$

.....

(3)

(Total for Question 8 is 5 marks)

21 (a) Factorise fully $15y^4 + 20uy^3$

.....

(2)

(b) Solve $4 - 3x = \frac{5 - 8x}{4}$

Show clear algebraic working.

$x =$ .....

(3)

(Total for Question 21 is 5 marks)

22 (a) Write 2 840 000 000 in standard form.

.....

(1)

(b) Write 2.5×10^{-4} as an ordinary number.

.....

(1)

(Total for Question 22 is 2 marks)

15 (a) Expand $5(3a + 4)$

.....

(1)

(b) Factorise $4c - 14$

.....

(1)

(c) Solve $5x - 11 = x + 6$
Show clear algebraic working.

$x =$ .....

(3)

(Total for Question 15 is 5 marks)

24 (a) Factorise fully $25a^4c^7d + 45a^9c^3h$

.....

(2)

(b) Solve $(2x + 5)^2 = (2x + 3)(2x - 1)$

$x =$ .....

(3)

(Total for Question 24 is 5 marks)

25 Jethro has sat 5 tests.
Each test was marked out of 100 and Jethro's mean mark for the 5 tests is 74

Jethro has to sit one more test that is also to be marked out of 100

Jethro wants his mean mark for all 6 tests to be at least 77

Work out the least mark that Jethro needs to get for the last test.

.....

(Total for Question 25 is 3 marks)

TOTAL FOR PAPER IS 100 MARKS

23 (a) Simplify $x^4 \times x^5$

.....

(1)

(b) Simplify $(4y^2)^3$

.....

(2)

(c) Factorise $n^2 - 7n + 12$

.....

(2)

(Total for Question 23 is 5 marks)

20 (a) Expand and simplify $(n - 6)(n + 4)$

.....

(2)

(b) Solve $2x - 3 = \frac{3x - 5}{4}$

Show clear algebraic working.

$x =$ .....

(3)

(Total for Question 20 is 5 marks)

23 (a) Factorise fully $18c^3d^2 - 21c^2$

.....

(2)

(b) (i) Factorise $y^2 - 3y - 18$

.....

(2)

(ii) Hence, solve $y^2 - 3y - 18 = 0$

.....

(1)

(Total for Question 23 is 5 marks)

21 (a) Expand and simplify $(m + 5)(m - 8)$

.....

(2)

(b) Solve $3n - 4 = \frac{5n + 6}{3}$

Show clear algebraic working.

$n =$ .....

(3)

(Total for Question 21 is 5 marks)

14 (a) Expand $x(x-7)$

.....

(1)

(b) Factorise $8y-10$

.....

(1)

$m = 5a + 7b$

(c) Work out the value of a when $m = 48$ and $b = 3$

$a =$ .....

(3)

(Total for Question 14 is 5 marks)

17 (a) Factorise fully $18c - 45cd$

.....

(2)

(b) Solve $\frac{5 - 2x}{6} = 3x - 4$

Show clear algebraic working.

$x =$ .....

(3)

(Total for Question 17 is 5 marks)

19 (a) Expand and simplify $3(c - 7) + 2(3c + 4)$

.....

(2)

(b) Expand and simplify $(x + 7)(x - 2)$

.....

(2)

(c) Factorise fully $28y^2 - 21y$

.....

(2)

(Total for Question 19 is 6 marks)

20 Abelie flew by plane from Dubai to Rome.

The flight time was 6 hours 42 minutes.
The average speed of the plane was 650 kilometres per hour.

Work out the distance the plane flew.

.....kilometres

(Total for Question 20 is 3 marks)

8 (a) Simplify $2e - 3f + 4e - 7f$

(2)

(b) Expand and simplify $5(4x + 3) - (3x - 1)$

(2)

(c) Factorise fully $4p + 6pq$

(2)

(Total for Question 8 is 6 marks)

20 (a) Expand and simplify $3x(2x + 3) - x(3x + 5)$

.....

(2)

(b) Make t the subject of the formula $p = at - d$

.....

(2)

Given that $\frac{w^5 \times w^n}{w^3} = w^{10}$

(c) work out the value of n.

$n =$ .....

(2)

(Total for Question 20 is 6 marks)

12 A circle has radius 8.5 cm

Work out the circumference of the circle.
Give your answer correct to 3 significant figures.

..... cm

(Total for Question 12 is 2 marks)

13 (a) Expand $x(3 - x)$

.....

(1)

(b) Factorise fully $12a - 18b$

.....

(2)

There are 8 slices of cheese in each small pack of cheese.
There are 20 slices of cheese in each large pack of cheese.

Afreen buys h small packs of cheese and j large packs of cheese.
She buys a total of T slices of cheese.

(c) Write down a formula for T in terms of h and j

.....

(3)

(Total for Question 13 is 6 marks)

16 (a) Factorise fully $12pq - 18p$

.....

(2)

There are 56 metal bars in a box.
Each metal bar is gold or silver or zinc.

y metal bars are gold.
$(3y + 7)$ metal bars are silver.
$(2y - 5)$ metal bars are zinc.

(b) Work out the number of metal bars that are zinc.
Show clear algebraic working.

.....

(4)

(Total for Question 16 is 6 marks)

20 (a) Simplify $\left(p^3\right)^5$

.....

(1)

(b) Expand and simplify $2n(4n + 3) + n(n - 4)$

.....

(2)

(c) Solve $\frac{2x + 5}{3} = 4 - x$

Show clear algebraic working.

$x =$ .....

(3)

(Total for Question 20 is 6 marks)

13 (a) Solve $3f - 5 = 11$

$f =$ .....

(2)

(b) Expand $w(w + 3)$

.....

(1)

$y = 5e^2 + 20$

(c) Work out the value of y when $e = -3$

$y =$ .....

(2)

(d) Factorise $x^2 - 5x - 36$

.....

(2)

(Total for Question 13 is 7 marks)

13 (a) Expand $x(5 - x)$

.....

(1)

(b) Factorise $3y - 21$

.....

(1)

(c) Make p the subject of the formula $f = 3p - d$

.....

(2)

Sergio buys m boxes of seeds and n packets of seeds.

Each box contains 10 seeds.
Each packet contains 6 seeds.

The total number of seeds that Sergio buys is T.

(d) Write down a formula for T in terms of m and n.

.....

(3)

(Total for Question 13 is 7 marks)

16 (a) Expand and simplify $x(2x - 3) + 7(2x + 1) - 5$

.....

(3)

(b) Expand and simplify $(y + 4)(2 - y)$

.....

(2)

(c) Factorise fully $15b^5c - 35b^3c^9$

.....

(2)

(Total for Question 16 is 7 marks)

13 (a) Expand and simplify $(e + 3)(e - 5)$

(2)

(b) Solve $y = \dfrac{2y + 1}{5}$

Show clear algebraic working.

$y =$

(3)

(c) Solve $x^2 + 3x - 18 = 0$

Show your working clearly.

(3)

(Total for Question 13 is 8 marks)

16 $P = 2g + 3h$

(a) Work out the value of P when $g = 7$ and $h = -4$

.....

(2)

(b) Simplify $e^9 \div e^5$

.....

(1)

(c) Simplify $(y^2)^8$

.....

(1)

(d) Expand and simplify $(x + 9)(x - 2)$

.....

(2)

(e) Factorise fully $16c^4p^2 + 20cp^3$

.....

(2)

(Total for Question 16 is 8 marks)

16 (a) Make a the subject of $d = g + 2ac$

.....

(2)

(b) Factorise fully $9ef - 12f$

.....

(2)

(c) Expand and simplify $(x + 2)(x - 5)$

.....

(2)

(d) Simplify fully $\dfrac{n^4 \times n^7}{n^5}$

.....

(2)

(Total for Question 16 is 8 marks)

20 (a) Solve $5(4 - x) = 7 - 3x$
Show clear algebraic working.

$x =$ .....

(3)

(b) Factorise fully $16m^3g^3 + 24m^2g^5$

.....

(2)

(c) (i) Factorise $y^2 - 2y - 48$

.....

(2)

(ii) Hence, solve $y^2 - 2y - 48 = 0$

.....

(1)

(Total for Question 20 is 8 marks)

11 $w = 5y^2 - y^3$

(a) Work out the value of w when $y = -2$

$w =$ .....

(2)

(b) Factorise fully $8p^2 - 2p$

.....

(2)

(c) Expand $4t(3t - 2)$

.....

(2)

(d) Expand and simplify $(5x - 2)(x + 4)$

.....

(2)

(Total for Question 11 is 8 marks)

23 (a) Solve $p = \dfrac{3p - 5}{10}$

Show clear algebraic working.

$p =$ .....

(3)

(b) Simplify a^0 where $a > 0$

.....

(1)

(c) Simplify fully $\dfrac{3xy^3}{6x^2y}$

.....

(2)

(d) Factorise fully $10c^3d^2 + 15cd^4$

.....

(2)

(Total for Question 23 is 8 marks)

21 (a) Simplify $(2c^4d^7)^3$

.....

(2)

(b) Find the value of $5y^0$ where $y > 0$

.....

(1)

(c) Factorise fully $16a^2b^3 + 20a^3b$

.....

(2)

(d) (i) Factorise $x^2 + 9x - 22$

.....

(2)

(ii) Hence solve $x^2 + 9x - 22 = 0$

.....

(1)

(Total for Question 21 is 8 marks)

22 (a) Solve $\frac{2f}{3} = 4f - 17$

Show clear algebraic working.

$f =$ .....

(3)

(b) Simplify $(e + 12)^0$ where $e > 0$

.....

(1)

(c) Simplify fully $\frac{12a^4h^6}{4ah^2}$

.....

(2)

(d) Factorise fully $20x^5y + 12x^3y^4$

.....

(2)

(Total for Question 22 is 8 marks)

16 (a) Simplify $y^5 \times y^9$

.....

(1)

(b) Simplify $(2m^3)^4$

.....

(2)

(c) Solve $5(x + 3) = 3x - 4$
Show clear algebraic working.

$x =$ .....

(3)

(d) (i) Factorise $x^2 + 2x - 24$

.....

(2)

(ii) Hence, solve $x^2 + 2x - 24 = 0$

.....

(1)

(Total for Question 16 is 9 marks)

21 (a) Expand and simplify $(m - 8)(m + 5)$

.....

(2)

(b) Factorise fully $5y + 20y^2$

.....

(2)

(c) Simplify $(p^2 + 3)^0$

.....

(1)

(d) Solve $3(2x - 5) = \frac{9 - x}{2}$

Show clear algebraic working.

$x =$ .....

(4)

(Total for Question 21 is 9 marks)

Turn over for Question 22

22 (a) Simplify $g^9 \div g^2$

.....

(1)

(b) Expand $5k^2(k^3 + 4)$

.....

(2)

(c) (i) Factorise $x^2 - 2x - 63$

.....

(2)

(ii) Hence, solve $x^2 - 2x - 63 = 0$

.....

(1)

(d) Solve the inequality $7 - 2y < 3y - 12$

.....

(3)

(Total for Question 22 is 9 marks)

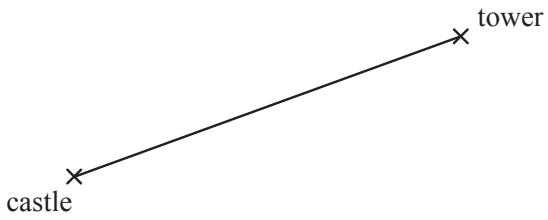
SUB-TOPIC A1c

FORMULAE & REARRANGING

Sub-topic A1c · 13 questions · 75 marks · lowest tariff first

10 The scale diagram shows the positions of a castle and a tower.

1 cm represents 1.5 km



Angela walks from the castle to the tower along a straight path.

She takes 18 minutes to walk each km.

Work out how many minutes Angela takes to walk from the castle to the tower.

..... minutes

(Total for Question 10 is 3 marks)

11 Make d the subject of the formula $c = 8d + 5$

.....

(Total for Question 11 is 2 marks)

13 $p = t - ac$

$t = 18$
$a = -3$
$c = 5$

(a) Work out the value of p

$p =$ .....

(2)

(b) Make x the subject of the formula $d = 3x + 10$

.....

(2)

(Total for Question 13 is 4 marks)

14 (a) Factorise $25f - 10$

.....

(1)

(b) Make y the subject of the formula $c = 5y - h$

.....

(2)

(c) Solve the inequality $4x + 7 > 2$

.....

(2)

(Total for Question 14 is 5 marks)

15 Show that $\frac{2}{5} \div \frac{11}{20} = \frac{8}{11}$

(Total for Question 15 is 2 marks)

12 (a) Expand $x(4 - x)$

.....

(1)

$t = ab - c$

$a = 1.5$ $b = 2.4$ $c = -5.6$

(b) Work out the value of t.

$t =$ .....

(2)

(c) Make d the subject of $y = dx - e$

.....

(2)

(Total for Question 12 is 5 marks)

21 (a) Make c the subject of $A = \frac{c}{y} - 5z$

.....

(2)

(b) Write down the value of g^0

.....

(1)

(c) Factorise $x^2 - 11x + 24$

.....

(2)

(Total for Question 21 is 5 marks)

12 (a) Make y the subject of $w = 3y - d$

.....

(2)

Diego buys b boxes of crayons and p packets of crayons.

There are 12 crayons in each box.
There are 3 crayons in each packet.

Diego buys a total of T crayons.

(b) Write down a formula for T in terms of b and p

.....

(3)

(Total for Question 12 is 5 marks)

18 (a) Make a the subject of the formula $M = ac - bd$

.....

(2)

(b) Solve the inequality $5x - 4 < 39$

.....

(2)

(c) Factorise fully $18e^2f^3 - 12e^3f$

.....

(2)

(Total for Question 18 is 6 marks)

21 (a) Simplify $g^7 \times g^3$

.....

(1)

(b) Simplify $(k^3)^5$

.....

(1)

(c) Simplify fully $\dfrac{20x^2y^6}{4x^2y^2}$

.....

(2)

(d) Make e the subject of the formula $h = 3e + f$

.....

(2)

(Total for Question 21 is 6 marks)

12 (a) Expand $x(x + 3)$

.....

(1)

(b) Factorise $8p + 10$

.....

(1)

(c) Make e the subject of $y = eh - f$

.....

(2)

Janya thinks of a whole number.
She calls her whole number w
Janya writes down this information about her whole number.

$$w > 7 \quad \text{and} \quad w \leqslant 10$$

(d) Write down the possible values of w

.....

(2)

(Total for Question 12 is 6 marks)

14 (a) Expand $x(10 - x)$

.....

(1)

(b) Factorise $6y + 27$

.....

(1)

(c) Make m the subject of the formula $h = \frac{m}{2} + 4$

.....

(2)

(d) Solve $7g + 3 = 2g - 5$
Show clear algebraic working.

$g =$ .....

(3)

(Total for Question 14 is 7 marks)

11 (a) Solve $5m + 7 = 24$

$m =$

(2)

(b) Make t the subject of $k = \dfrac{t - e}{2}$

(2)

(c) Simplify $p^8 \div p^3$

(1)

(d) Simplify n^0

(1)

(e) Simplify $(3x^2y^5)^3$

(2)

(Total for Question 11 is 8 marks)

5 (a) Simplify $w + w + w + w - w$

.....

(1)

(b) Simplify $4 \times a \times 2$

.....

(1)

(c) Simplify $f \times f \times f \times f \times f$

.....

(1)

(d) Simplify $4c + 4h + 5c - 6h$

.....

(2)

(e) Factorise $10d + 15$

.....

(1)

(f) Make t the subject of $e = 7t + g$

.....

(2)

(Total for Question 5 is 8 marks)

23 (a) Expand $x(x - 3)$

.....

(1)

(b) Make t the subject of $m = \frac{t + 4}{5}$

.....

(2)

(c) Simplify $a^6 \times a^{10}$

.....

(1)

(d) Simplify $c^{30} \div c^{12}$

.....

(1)

(e) (i) Factorise $y^2 - 10y + 21$

.....

(2)

(ii) Hence, solve $y^2 - 10y + 21 = 0$

.....

(1)

(Total for Question 23 is 8 marks)

MARK SCHEMES

official mark schemes, in the same order as the questions

4	(a)		12	1	B1	
	(b)	'12' × 2.5	30	1	B1ft	Ft their 12
	(c)	One and a quarter rectangles	One and a quarter rectangles drawn oe	1	B1	ft their 12
	(d)	36 × 5000 (= 180 000) or 200 000 ÷ 5000 (=40)		2	M1	
			No and 180 000		A1	for no oe **and** 180 000 **or** no oe **and** 40 **or** no oe **and** 20 000 short or 20 000 **and** short/off
						Total 5 marks

5	(a)		10*ab*	1	B1	
	(b)		4	1	B1	
						Total 2 marks

6	(a)		cuboid	1	B1	Accept rectangular cuboid or rectangular prism. Do not accept cube
	(b)		6.5	1	B1	Accept 6.4 – 6.6
	(c)		A and F	1	B1	May be stated or could be circled in list
						Total 3 marks

3		$7x$	1	B1	cao
		$28p$	1	B1	cao
					Total 2 marks

4	(a)		548	1	B1 cao
	(b)		4.6	1	B1 allow 4.6000….
	(c)	(32 – 5) ÷ 2		2	M1
		Correct answer scores full marks (unless from obvious incorrect working)	13.5		A1 oe
					Total 4 marks

5	(a)		15	1	B1 cao
	(b)	19 – 13		2	M1 19 and 13 selected or $a - b$ where $a = 19$ or $b = 13$
		Correct answer scores full marks (unless from obvious incorrect working)	6		A1 cao
					Total 3 marks

6	(a)		20	1	B1 cao
	(b)		add 4	1	B1 oe 4 times table or $4n$ or goes up in 4's, allow 'the gap is +4' but not 'the gap is 4'
	(c)		$4n$	1	B1 $4n + 0$ not n = 4×n
					Total 3 marks

International GCSE Mathematics				
Values in quotation marks must come from a correct method previously seen unless clearly stated otherwise.				
Q	**Working**	**Answer**	**Mark**	**Notes**
1 (a)		725	1	B1 cao
(b)		32	1	B1 cao
(c) (i)		4578	1	B1 cao
(ii)		8754	1	B1 cao
				Total 4 marks

2	(a)		24	1	B1 cao
	(b)	"24" + 32 + 42 + 28 or 15 × 8 + 4 + 2 oe		2	M1 ft their "24", allow one error or omission in adding values
			126		A1 cao
	(c)		2 and ¾ circles	1	B1 oe eg 2 and ½ and ¼ circles
					Total 4 marks

3	(a)		6	1	B1 cao
	(b)		8	1	B1 cao
	(c)		diameter	1	B1 accept chord, condone incorrect spelling
	(d)		tangent	1	B1 condone incorrect spelling
					Total 4 marks

4	(a)		20*e*	1	B1 allow *e*20
	(b)		15	1	B1 cao
					Total 2 marks

4	(a)		5	1	B1
	(b)	3 × 100 (= 300) **or** 3 – 0.85 (= 2.15) **or** digits 300 – 85 **or** 85 – digits 300		2	M1 for conversion to centimetres **or** a method to work out the difference in metres **or** a method to find the difference in centimetres using their converted 300 For digits 300, allow 30, 300, 3000, 0.3, 0.03 and so on, but **NOT** 3
		Correct answer scores full marks (unless from obvious incorrect working)	215		A1 allow –215
					Total 3 marks

5	(a)		5*a*	1	B1
	(b)		7*bc*	1	B1 oe eg 7*cb*
	(c)		8	1	B1
					Total 3 marks

6	(a)		25	1	B1 cao
	(b)		−23	1	B1 cao
					Total 2 marks

Question		Working	Answer	Mark	Notes
8	a		y^3	1	B1
	b		$6cd$	1	B1
	c		k	1	B1 accept $1k$
9	a		Alto Campoo	1	B1 Do not accept −8
	b		8	1	B1
	c	$(-7) - 1800 \div 300$	−13	2	M1 for $\pm 1800 \div 300$ or ± 6 A1
10	a		$\frac{10}{20}$	1	B1 Accept 0.5, $\frac{1}{2}$, $\frac{5}{10}$, 50%
	b		$\frac{3}{20}$	1	B1 Accept 0.15, 15%
	c	$\frac{9}{20+1+2+2}$ or $\frac{7}{20}$ $\frac{9}{25} = 0.36$ and $\frac{7}{20} = 0.35$	Adam with reason	3	M1 for at least one probability M1 for both correct probabilities A1 Adam with 0.36 and 0.35 clearly seen oe

Question		Working	Answer	Mark	Notes
6	(a)	**Biology** / **Chemistry** / **Physics** **boys**: 25 / **5** ..... / 7 **girls**: **6** ..... / 4 / **33** ..... **TOTAL**: 31 / **9** ..... / **40**	Correct completed table **TOTAL** **37** ..... / 43 / 80	3	M2 for at least 4 correct entries or M1 for at least 2 correct entries A1 fully correct table.
	(b)		$\frac{43}{80}$	1	B1 0.5375 or 0.538
	(c)		$\frac{4}{43}$	2	M1 For $\frac{4}{n}$ $(n > 4)$ or $\frac{m}{43}$ $(m < 43)$ A1 Correct probability (allow 0.093(02...)) NB:penalise incorrect notation in (b) and (c) once only
7	(a)		14	1	B1
	(b)		220	2	M1 For −10, × 2 or 110 A1
8			8 hours 35 mins	2	B2 for (B1 for 8 hours or 35 minutes or 515 minutes)
9		(2 × 2.10) + (2 × 1.80) (= 7.80) or 20 – 8.75 (=11.25) or [20 – (‘7.80’+ 8.75)] ÷ 3 or [11.25 – 2(2.10 + 1.80)] ÷ 3	1.15	3	M1 M1 A1

11	(−1, −5)(0, −3)(1, −1)(2, 1)(3, 3)(4, 5)(5, 7)	Correct line between $x = -1$ and $x = 5$	3	B3	For a correct line between $x = -1$ and $x = 5$
				B2	for a correct line through at least 3 of (−1, −5)(0, −3)(1, −1)(2, 1) (3, 3)(4, 5)(5, 7) **OR** for all of (−1, −5)(0, −3)(1, −1)(2, 1)(3, 3) (4, 5)(5, 7) plotted, not joined.
				B1	For at least 2 correct points stated (may be in a table) **OR** For a line drawn with a positive gradient through (0, −3) **OR** for a line with gradient of 2
					Total 3 marks

12	(**A** =) $\frac{1}{5} \times 75 (=15)$ oe **or** $\left(1-\frac{1}{5}\right) \times 75 (=60)$ oe		3	M1
	$\frac{75-"15"}{2} (=30)$ oe **or** $\frac{"75"-15-4}{2} (=28)$ oe **or** $\frac{"75"-15+4}{2} (=32)$ oe			M1 workings could be seen in an equation
		15, 32, 28		A1
				Total 3 marks

13		$T = 2p + 3c$	3	B3	[award B2 if $T = 2p + 3c$ is incorrectly simplified] (condone $T = 2 \times p + 3 \times c$)
				(B2)	for $T = 2p + kc$ **or** $T = kp + 3c$ (k may be zero) **or** $2p + 3c$
				(B1)	for $2p$ **or** $3c$ **or** T = a linear expression in p and c e.g. $T = p + c$
					Total 3 marks

7	(a)	21 : 48		2	M1 or 16 : 7
			7 : 16		A1 cao
	(b)		$\frac{11}{15}$	1	B1 oe exact fraction
					Total 3 marks

8	0.14 × 350 (= 49)		3	M1
	'49' + 25 or 0.14 × 350 + 25			M1
		74		A1
				Total 3 marks

9	(i)	360 – (92 + 44) (= 224) oe **or** 92 + 44 + x + x = 360 oe		3	M1
		'224' ÷ 2 or 2x = '224' oe			M1
			112		A1
	(ii)		Correct reason	1	B1 dep on M1 for a correct reason Angles in a quadrilateral sum to 360^o (accept Angles in a quadrilateral sum to 360^o)
					Total 4 marks

International GCSE Maths

Apart from Questions 6b, 9, 11, 18, 20b and 21a (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	(a)		Gazientep	1	B1
	(b)		Two thousand, five hundred and thirty four	1	B1
	(c)		2350	1	B1 cao
	(d)		608	1	B1 Accept −608
	(e)		4	1	B1 cao
					Total 5 marks

2	(a)		$8a$	1	B1 cao
	(b)		$24b$	1	B1 cao
	(c)		27	1	B1 cao
					Total 3 marks

3	(a)(i)		C	1	B1 cao
	(ii)		A	1	B1 cao
	(b)		Correct reason	1	B1 e.g. for probability cannot be more than 1 oe It adds to 1 oe Scale goes to 1 oe It has to be below 1 oe
					Total 3 marks

17		$T = 0.2(12n + 50)$ oe	3	B3 for $T = 0.2(12n + 50)$ oe or $T = 0.2 \times (12n + 50)$ oe for $T = 0.2 \times (12 \times n + 50)$ oe or $T = \frac{12n + 50}{5}$ oe or $T = 2.4n + 10$ oe B2 for $0.2(12n + 50)$ oe or $0.2 \times 12n + 50$ oe or $T = 0.2 \times 12n + 50$ oe or $T = n \times 12 + 50 \times 0.2$ oe or $T = 12n + 50 \div 5$ oe or $T = n(12) + 50(0.2)$ oe B1 for $n \times 12 + 50 \times 0.2$ oe or $12n + 50 \div 5$ oe or $n(12) + 50(0.2)$ oe or T = a linear expression in n e.g. $T = n$
				Total 3 marks

18	(a)		w^9	1	B1	
	(b)		$10m^7p^3$	2	B2	(B1 for 2 terms correct as part of a product)
						Total 3 marks

19	$1600 \times 0.16\ (=256)$ oe or $1 - 0.16\ (=0.84)$ oe		4	M1	
	$1600 -$ "256" or $1600 \times$ "0.84" $(=1344)$			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

14		$F = 2r + 7h$	3	B3	for $F = 2r + 7h$ oe
				(B2	for $2r + 7h$ **or** $F = 2r + ah$ **or** $F = br + 7h$ **or** $F = 2h + 7r$)
				(B1	for $2r + ah$ **or** $br + 7h$ **or** $2h + 7r$ **or** $F = 2r$ **or** $F = 7h$ **or** for F = an incorrect expression in r and h)
	Correct answer scores full marks (unless from obvious incorrect working)				**Total 3 marks**

15	eg $\frac{21}{35}$ and $\frac{10}{35}$ **or** $\frac{21n}{35n}$ and $\frac{10n}{35n}$		2	M1	for finding a common denominator with at least one fraction correct
	$\frac{21}{35}+\frac{10}{35}=\frac{31}{35}$ $\frac{21n}{35n}+\frac{10n}{35n}=\frac{31n}{35n}=\frac{31}{35}$	Shown		A1	dep on M1, for a complete correct method leading to $\frac{31}{35}$
	Working required				**Total 2 marks**

International GCSE Maths					
Apart from questions 11, 18, 20, 21b and 26 (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	(a)		Saimaa	1	B1 Accept 13 600
	(b)		Six thousand one hundred and twenty four	1	B1
	(c)		6189	1	B1 cao
	(d)		60	1	B1 or 6 tens or sixty
	(e)		3808 & 4361	1	B1 accept Kentucky and Superior
					Total 5 marks

2	(a)		$15p$	1	B1 cao
	(b)		$36q$	1	B1 cao
	(c)		3.75	1	B1 or $\frac{15}{4}$ or $3\frac{3}{4}$ oe
					Total 3 marks

12	*CED* = 180 – 125 (= 55) or *BCD* = 360 – (86 + 78 + 128) (= 68)		5	M1 angles may be marked on diagram or labelled unambiguously in working
	DCE = 180 – (2 × "55")(= 70)			M1 angles may be marked on diagram or labelled unambiguously in working
	Correct answer of 138 scores 3 marks (unless from obvious incorrect working)	138		A1 for 138
				B2 (dep on M2) for all correct reasons for their method (B1 (dep on M1) for one correct reason for their method) Angles on a straight line add to 180 Angles on a straight line add to 180 Isosceles triangle Angles in a triangle add to 180 Angles in a triangle add to 180 Angles in a quadrilateral add to 360 Angles in a quadrilateral add to 360
				Total 5 marks

13	(a)	2*n* **or** *n* + 7		2	M1 for 2*n* oe **or** *n* + 7 oe
		Correct answer scores full marks (unless from obvious incorrect working)	4*n* + 7		A1 oe eg 7 + 4*n*
	(b)		*T* – "(4*n* + 7)"	1	B1ft oe, ft *T* – [their answer (a)]
					Total 3 marks

Question		Working	Answer	Mark	Notes
10*	(a)		A correct reason	1	B1 He should have got 30 + 20 oe The answer should be 50 oe −4 ×−5 = (+) 20 oe Minus and minus gives a positive oe etc
	(b)		1, 3, 5, 7, 9	2	B2 for 1, 3, 5, 7, 9 with no extras (in any order) (B1 for four correct values with no more than one incorrect or for five correct values with no more than one incorrect)
					Total 3 marks

Question		Working					Answer	Mark	Notes
11	(a)		**tennis**	**athletics**	**cricket**	**Total**	A correctly completed table	3	B3 (B2 for 4 or 5 correct entries B1 for 2 or 3 correct entries)
		Monday	29	23	58	110			
		Tuesday	33	50	47	130			
		Total	62	73	105	240			
	(b)						$\frac{58}{105}$	1	B1 oe 0.55(238…) or 55(.238…)% truncated or rounded
									Total 4 marks

Question		Working	Answer	Mark	Notes
11	a		101	1	B1
	b	$\sqrt{1025-1}$	32	2	M1 A1
12		180 − 124 = 56 56 ÷ 2	28	3	M1 M1 A1
13		$\frac{21}{24}-\frac{4}{24}$	Shown	2	M1 for 2 correct fractions with a common denominator A1 for $\frac{17}{24}$ from correct working e.g. $\frac{34}{48}=\frac{17}{24}$
14	a	15 − 8×(−4) or 15 + 32	47	2	M1 A1
	b	18 = 4p – 24	10.5	2	M1 A1 oe M1 $\frac{18}{4}=p-6$ A1 oe
15		240 m, 200 f $\frac{65}{100}\times$ "240" (= 156) or $\frac{85}{100}\times$ "200" (= 170) 156 + 170	326	4	B1 for 240 and 200 M1 as long as their numbers add up to 440 M1 (dep M1) A1 SC:B2 for 334

Question		Working	Answer	Mark	Notes
9	(a)	Eg $6\times3-2\times-5$ **or** 18 **and** (−)10	28	2	M1 for correct substitution A1
	(b)	Eg $2-15=2p$ **or** $2p=-13$ oe **or** $p=\frac{B-3m}{2}$	$-\frac{13}{2}$ oe	2	M1 for isolating $2p$ in a correct equation A1
10	(a)		$\frac{3}{16}$ oe	1	B1
	(b)	13 × 18 ÷ 3 or 13 × 6	78	2	M1 A1

Question		Working	Answer	Mark	Notes
7		$\frac{60}{100} \times 53.50$ (= 32.1(0)) **or** $\frac{60}{100} \times 53.50 \times 2$ (= 64.2(0))	28.8(0)	4	M1 oe
		2 × 53.50 + 2 × "32.10" (= 171.2(0)) **or** 2 × 53.50 + "64.20" (= 171.2(0))			M1
		200 – "171.20"			M1
					A1
8	(a)		$4x + 3y$	2	B2 (B1 for $4x$ or $+ 3y$)
	(b)	$2t = 12 - 3$	4.5	2	M1 or for $t + \frac{3}{2} = \frac{12}{2}$
					A1 oe
9	(a)		Pattern	1	B1
	(b)		13	1	B1
	(c)		15	1	B1
	(d)	3 + 49 ×2 **or** 2n + 1 **or** 2 × 50 + 1	101	2	M1
					A1

Question		Working	Answer	Mark	Notes
1	(a)		0.23	1	B1
	(b)		70	1	B1
	(c)		0.2	1	B1
	(d)		6 triangles shaded	1	B1
	(e)		79	1	B1
2	ai		Likely	1	B1
	aii		Impossible	1	B1
	(b)		× at $\frac{3}{10}$	1	B1
3		150 ÷ 6 (=25) or 6 × 25 = 150 or 1.03 ÷ 6 (=0.17…)			M1
		"25" × 1.03 or "0.17…" × 150			M1 dep
			25.75	3	A1
4	(a)		5*m*	1	B1
	(b)		35*p*	1	B1
	(c)		5	1	B1
	(d)		15	1	B1

7	(a)		60	1	B1	for 60
	(b)	3×6 (=18)		2	M1	for 3×6 (=18)
			20		A1	for 20
	(c)		+3	1	B1	or $\times\frac{8}{5}$
						Total 4 marks

8	(a)		−4, (−1), 2, (5), 8, 11, (14), 17	2	B2	for −4, 2, 8, 11, 17
					(B1	for 3 or 4 correct values)
	(b)			2	M1	(may ft from (a) if B1 awarded) for at least 5 points correctly plotted – if no plots, use points at which graph crosses squares or M1
			Graph drawn		A1	for correct graph drawn from $x = -1$ to $x = 6$
						Total 4 marks

Question	Working	Answer	Mark	Notes
17	$4x$ or $x - 7$		4	M1 Correct expression for B or C
	$x + 4x + x - 7 = 137$ oe			M1 Correct equation
	$x = 144 \div 6$ (=24) or $6x = 144$			M1 Gathering up the x's and numbers Dep on previous M1
		17		A1
				Total 4 marks

18	(a)		$3e^2 - 5e$	1	B1
	(b)		$5(7 + f)$	1	B1
	(c)		$64p^3q^6$	2	B2 B1 for 2 correct parts of the product
					Total 4 marks

19	$8.5^2 + 5.6^2$ (=103.61)		3	M1
	$\sqrt{8.5^2 + 5.6^2}$			M1
		10.2		A1 awrt 10.2
				Total 3 marks

20	3 hours 36 mins = 216 mins or 3.6 hours		3	M1
	2470 ÷ 3.6 or 2470 ÷ 216 × 60 oe			M1 Allow 2470 ÷ 3.36 (=735 or better)
		686		A1
				Total 3 marks

21	(adding) $10x = -5$ or $21x + 35y = 42$ $21x - 15y = -33$ then $50y = 75$		3	M1 Correct method to eliminate x or y: coefficients of x or y the same **and** correct operator to eliminate selected variable or correct substitution for x or y into 2nd equation
		$x = -0.5$ oe $y = 1.5$ oe		A1 Both A marks dep on M1 A1
				Total 3 marks

7	(a)		$13x - 2y$	2	B2 (B1	accept $-2y + 13x$ for $13x$ or $-2y$)
	(b)	$2n = 16 - 5$ or $2n = 11$ oe **or** $(16 - 5) \div 2$		2	M1	for a correct first step **or** a correct calculation for n
			5.5		A1	for 5.5 or $\frac{11}{2}$ or $5\frac{1}{2}$
						Total 4 marks

8	(a)	<table><tr><th></th><th>ramen</th><th>soba</th><th>udon</th><th>Total</th></tr><tr><td>**Boiled**</td><td>18</td><td>**5**</td><td>**8**</td><td>31</td></tr><tr><td>**Fried**</td><td>**10**</td><td>12</td><td>7</td><td>**29**</td></tr><tr><td>**Total**</td><td>**28**</td><td>**17**</td><td>15</td><td>60</td></tr></table>	Correct table	3	B3 (B2 B1	All 6 correct entries 4 or 5 correct entries 2 or 3 correct entries)
	(b)		$\frac{7}{60}$	1	B1	accept 0.11666... (accept 2 d.p. or better truncated or rounded) or 11.666...% (accept 2 s.f. or better truncated or rounded)
						Total 4 marks

8	a		a^4	1	B1
	b		$20bc$	1	B1
	c		$7d - 3e$	2	B2 (B1 for $7d$ or $-3e$ or $7d + -3e$)
					Total 4 marks

9	E.g. $42 \div 3$ (= 14) or $68 \div 8$ (= 8.5) or 42×3 (= 126) or $\frac{15}{8} \times 68$ (= 127.5)			M1 for a correct first step
	E.g. $9 \times$ '14' + $15 \times$ '8.5' oe or '126' + '127.5'			M1 for a complete method
		253.5	3	A1
				Total 3 marks

10	(180 – 44) ÷ 2 (= 68)			M1 May be seen on diagram
	180 – '68' **or** 44 + '68'			M1
		112	3	A1
				Total 3 marks

3	(3.7 + 6.1) ÷ 2 oe or 6.1 – ((6.1 – 3.7) ÷ 2) oe or 3.7 + ((6.1 – 3.7) ÷ 2) oe		2	M1	Allow list of decimals from 3.7 to 6.1 showing a method to find halfway (eg crossing of each end to get to the middle) Allow one error in the list.
	Working not required, so correct answer scores full marks (unless from obvious incorrect working)	4.9		A1	oe
					Total 2 marks

4	(a)		$30d$	1	B1	Allow $d30$ but not $30\times d$
	(b)		$4e$	1	B1	cao
	(c)		7	1	B1	cao
	(d)		14	1	B1	cao
						Total 4 marks

8		add 489 to 13 203	2	B2	oe eg accept 489 + 13 203 (B1 for sight of 489 × 27 = 13 203)
					Total 2 marks

9	(a)		$7p - t$	2	B2	Fully correct answer (allow $-1t$) (B1 for $7p$ or $-t$)
	(b)	eg 8 × 5 – 3 × 4 **or** 40 – 12		2	M1	for a complete method
			28		A1	
						Total 4 marks

10	(a) (i)		35	1	B1	if answer line is blank, check the diagram
	(ii)	vertically opposite angles are equal **or** vertically opposite angles are equal		1	B1	
	(b) (i)	(*BEC* =) 180 – 90 – 35 (= 55) **or** (*BEH* =) 35 + 90		2	M1	for a method to find angle *BEC* **or** *BEH*
			125		A1	if answer line is blank, check the diagram
	(ii)	eg Angles in a triangle add to 180° (allow angles in a triangle add to 180°) Angles in a triangle sum to 180° (allow angles in a triangle sum to 180°) Angles on a straight line add to 180° (allow angles on a straight line add to 180°) The exterior angle of a triangle is equal to the sum of the interior opposite angles		1	B1	(dep on M1) for one correct reason
						Total 5 marks

Question		Working	Answer	Mark	Notes
10	(a)			2	M1 $60 + 17$ (=77) or $(60 \pm n) \div 7$ where n is any number or $7 \times 11 - 17$
		Working not required, so correct answer scores full marks (unless from obvious incorrect working)	11		A1
	(b)	[condone $y = \ldots\ldots$ or $x = \ldots\ldots$]	$\frac{x+7}{5}$	2	B2 oe eg $\frac{1}{5}(x + 7)$ or $0.2x + 1.4$ (B1 for $x + 7 \div 5$ with no arrows)
					Total 4 marks

10	(a)	175 × 1.8 (= 315)		2	M1	for a correct first step
		Correct answer scores full marks (unless from obvious incorrect working)	347		A1	cao
	(b)	482 – 32 (= 450)		2	M1	for −32 or ÷1.8
		Correct answer scores full marks (unless from obvious incorrect working)	250		A1	cao SCB1 for answer of 464(.2...)
						Total 4 marks

11	(a)		$5c$	1	B1	
	(b)		$-2w + 12y$	2	B2	oe (B1 for $-2w$ or $12y$)
	(c)		3	2	B1	cao
			31		B1	cao
	(d)	$7x + 35$		3	M1	a correct expansion of the bracket (need not be in an equation)
		$7x + 3x = 8 - 35$ oe eg $10x = 8 - 35$ **or** $10x = -27$ **or** $7x + 3x = -27$			M1	for isolating terms in x and number terms ft from an incorrect expansion in the form $7x + c$ or $x + 35$
		Working required	–2.7		A1	(dep on M1) oe
						Total 8 marks

Question		Working	Answer	Mark	Notes
5	a		$x = -3$ drawn	1	B1 accept unlabelled
	b	$\frac{4+1}{2}, \frac{2+4}{2}$	(2.5, 3)	2	M1 or one coordinate correct A1
	c		(2, −1)	2	B2 (B1 *D* placed correctly on the grid)
6	a		64	1	B1
	b	20 + 8 = 28 28 ÷ 4	7	2	M1 for +8 or ÷ 4 A1
	c		10	2	M1 for 8 × 5 or 40 A1
7	a		4, 7, 5, 4	2	M1 attempt to find frequencies (at least 2 correct) A1 fully correct
	b		Completed bar chart	3	M1 for 4 bars + labels on bars A1 correct heights ft a completed table A1 fully correct ft a completed table inc label on *y* axis Allow different widths of bars, gaps or no gaps between bars

5		$\frac{3}{5}$ × (12481 – 8906) (=2145) **or** 1 – $\frac{3}{5}$(=$\frac{2}{5}$) **and** 12481 – 8906 (=3575)		4	M2 If not M2 then award M1 for either 12481 – 8906 (=3575) **or** 1 – $\frac{3}{5}$(=$\frac{2}{5}$)
		3575 – "2145" **or** $\frac{2}{5}$ × "3575"			M1 dep
			1430		A1
					Total 4 marks

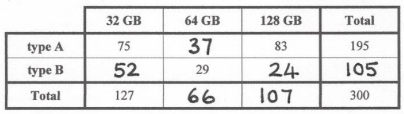
6	(a)		12*ef*	1	B1
	(b)		3*m* + 8*k*	2	B2 B1 for 3*m* or (+) 8*k*
	(c)	5*y* = 14 – 3 **or** 5*y* = 11 **or** 3 – 14 = –5*y* **or** –11 = – 5*y*		2	M1
			$2\frac{1}{5}$		A1 for $2\frac{1}{5}$ or $\frac{11}{5}$ oe or 2.2
					Total 5 marks

9	(a)(i)		$\frac{2}{11}$	3	B1	oe e.g. 0.18....
	(a)(ii)		$\frac{5}{11}$		B1	oe, e.g.0.45...
	(a)(iii)		0		B1	oe e.g. $\frac{0}{11}$
	(b)	$\frac{1}{6} = \frac{5}{30}$ oe **or** 5 × 6 (= 30)		2	M1	
			18		A1	
						Total 5 marks

10	(a)		47	1	B1	
	(b)	(82 + 9) ÷ 7 **or** 82 + 9 (= 91)		2	M1	for + 9 **or** ÷ 7
			13		A1	
	(c)		$7y - 9$	2	B2	oe e.g. $y \times 7 - 9$
					(B1)	for $7y$ **or** $y - 9$ **or** $y = 7y - 9$
						Total 5 marks

5	(a)		13	1	B1	
	(b)	160 × 2 (=320)or "160 × 2" – 5 or "160 × 2 – 5" ÷ 3	105	2	M1	One correct inverse operation used
					A1	
	(c)		$P = \frac{3n+5}{2}$	2	B2	oe (B1 for $\frac{3n+5}{2}$ oe or $P = 3n + 5 \div 2$ or for P = a formula including n with 2 operations correct eg $P = 3n + 5$ or for $n = \frac{2P-5}{3}$ or $P = \frac{2n-5}{3}$)
						Total 5 marks

6	(a)		12	1	B1	
	(b)		8	1	B1	
	(c)	Two intersecting arcs with equal radius		2	M1	For arcs that intersect within guidelines or correct equilateral triangle drawn without arcs
			Correct equilateral triangle with arcs		A1	
						Total 4 marks

6 (a)			3	B3 For all correct entries (B2 for 4 or 5 correct entries) (B1 for 2 or 3 correct entries)
(b)		$\frac{29}{300}$	1	B1 oe eg 0.096(666…)
(c)		$\frac{83}{195}$	2	B2 oe eg 0.42(564…) (B1 for $\frac{83}{m}$ where $m > 83$ or $\frac{n}{195}$ where $n < 195$)
				Total 6 marks

7	(a)		6	1	B1
	(b)		19	1	B1
	(c)		$5h$	1	B1 oe
	(d)		$3a + 11f$	2	B2 oe eg $11f + 3a$ (B1 for $3a$ or $11f$)
					Total 5 marks

7	(a)		$2c + 7d$	2	B2	(B1 for $2c$ or $7d$)
	(b)		$40ef$	1	B1	
	(c)	$5r = 8 + 3$ or $5r = 11$ or $-3 - 8 = -5r$ or $-11 = -5r$ or $r - \frac{3}{5} = \frac{8}{5}$ or $(8 + 3) \div 5$		2	M1	for a correct first step or for a calculation for r
			2.2		A1	oe
						Total 5 marks

8	(a)	(DBC =) 180 – (93 + 42) (= 45) **OR** (x =) 93 + 42		2	M1	for method to find angle DBC **OR** using exterior angle is equal to the sum of the two opposite interior angles
			135		A1	
	(b)(i)	360 – (90 + 100 + 114) oe		2	M1	for a complete method to find y
			56		A1	
	(ii)		Angles at a point sum to 360°	1	B1	
						Total 5 marks

9	0.4 × 2500 (1000) **or** 0.6 × 2500 (= 1500) oe		4	M1	for finding 40% or 60% of 2500
	2500 – "1000" – 300 (= 1200) oe **or** "1500" – 300 (= 1200) oe			M1	for method to find the remaining money
	"1200" ÷ (3 + 7) × 7 oe			M1	for method to find the amount of money spent on food
		840		A1	
					Total 4 marks

14	(a)	$2.6 \times 40 + 30$ oe		2	M1	
			134		A1	allow 2 h 14 mins
	(b)	$2 \times 60 + 40$ (= 160) oe		3	M1	convert 2 hours 40 minutes to minutes
		("160" − 30) ÷ 40 **or** "130" ÷ 40			M1	for a complete method
			3.25		A1	oe eg $3\frac{1}{4}$ or $\frac{13}{4}$ (Note: may see use of their part (a))
						Total 5 marks

15	eg $10.5 \div (5-2)$ (= 3.5(0)) **or** $\frac{5}{7} - \frac{2}{7}\left(=\frac{3}{7}\right)$ **or** $10.5 \times \frac{5}{5-2}$ (= 17.5) **or** $10.5 \times \frac{2}{5-2}$ (= 7)		3	M1	for finding the value of one share **or** the difference as a fraction **or** Bella's share **or** Millie's share
	eg "3.5"×7 **or** $10.5 \div "\frac{3}{7}"$ or "17.5" + "7"			M1	for a complete method
		24.5(0)		A1	oe eg $\frac{49}{2}$
					SCB1 for an answer of 3 and/or 7.5 oe
					Total 3 marks

16	$\frac{62.3...}{6.07...}$		2	M1	for 62.3(2) **or** 6.07(646…) **or** 10.2 **or** 10.3 **or** 10.25 **or** 10.26 **or** 10.255 **or** 10.256
		10.2559(6871)		A1	
					Total 2 marks

9	(a)		a^5	1	B1
	(b)		$24bc$	1	B1 oe
	(c)		$3x + 12$	1	B1 or $12 + 3x$
	(d)	e.g. $5\times\left(\frac{1}{2}\right)^2-\frac{1}{4}$ or $5\times(0.5)^2-0.25$ oe or $5\times\frac{1}{4}-\frac{1}{4}$ oe or $5\times0.25-0.25$ oe		2	M1 for substituting values for v and w
			1		A1 oe e.g. $\frac{4}{4}$
					Total 5 marks

10	6 hrs 40 mins or $6\frac{2}{3}$ or $\frac{20}{3}$ or 400 mins		4	B1
	e.g. $(6 \times 60 + 40) \times 60$ (= 24 000) oe or "their 400" × 60 (= 24 000) oe or $\frac{60}{8}$ (= 7.5) oe or $\frac{60\times60}{8}$ (= 450) oe or 7.5×60 (= 450) oe			M1 for converting their time difference into seconds **or** finding the number of bolts produced in 1 minute oe **or** finding the number of bolts produced in one hour oe
	e.g. "24 000" ÷ 8 oe or "their 400" × "7.5" oe or "their $6\frac{2}{3}$"×"450" oe			M1 for a complete method to find how many bolts are produced
		3000		A1
				Total 4 marks

6	$\frac{1}{4} \times 600$ (= 150) oe or $\frac{3}{4} \times 600$ (= 450) oe		4	M1
	"450" × 13.60 (= 6120)			M1
	(7200 – "6120") ÷ "150" or 1080 ÷ "150"			M1
	Correct answer scores full marks (unless from obvious incorrect working)	7.2(0)		A1 SC B2 for 11.46(666…)
				Total 4 marks

7	(a)		$45pk$	1	B1 accept $45kp$
	(b)		$11e - 5f$	2	B2 for $11e - 5f$ (B1 for $11e$ or $-5f$)
	(c)	$2d = 16 - 7$ or $2d = 9$ or $d + \frac{7}{2} = \frac{16}{2}$ oe or (16 – 7) ÷ 2 or 9 ÷ 2		2	M1
		Correct answer scores full marks (unless from obvious incorrect working)	4.5		A1 accept $\frac{9}{2}$ or $4\frac{1}{2}$
					Total 5 marks

11	(a)	0.48031(4...) + 0.45555(5...) **or** $\frac{61}{127}+\frac{41}{90}$		2	M1	Evaluate either fraction correctly as a decimal to at least 5 sf (rounded or truncated) or as a simplified fraction or an answer of 0.935, 0.936, 0.9358 or 0.9359
		Correct answer scores full marks (unless from obvious incorrect working)	0.93587(05162)		A1	Correct to at least 5 sf (rounded or truncated)
	(b)		0.936	1	B1	ft if at least 4 sf given in (a)
						Total 3 marks

12	(a)	(T =) 2.5 × 12 (+) 1.5 × 5		2	M1	
		Correct answer scores full marks (unless from obvious incorrect working)	37.5		A1	Accept 38 with working shown
	(b)	55 = 2.5d + 1.5 × 8 **or** 55 – 1.5 × 8 (= 43) **or** 55 – 12 (= 43)		3	M1	Form a correct equation **or** subtract time taken for bus stops from 55
		2.5d = 55 – 1.5 × 8 oe **or** 2.5d = 43 oe **or** "43" ÷ 2.5 oe			M1	Isolate term in d in a correct equation **or** a correct calculation for journey length
		Correct answer scores full marks (unless from obvious incorrect working)	17.2		A1	
						Total 5 marks

7	(a)		c^5	1	B1	
	(b)		7	1	B1	
	(c)		18	1	B1	Look in body of script if nothing on answer line
	(d)		$10 + 15h$	1	B1	
	(e)		$g(g + 7)$	1	B1	
						Total 5 marks

8	(a)		38	1	B1	
	(b)		×3 or +12	1	B1	
	(c)		29	1	B1	
	(d)	(61 – 5) ÷ 8 oe **or** 5 + 8 + 8 + 8 + 8 + 8 + 8 + 8 + 8 = 61 oe eg 13 + 8 + 8 + 8 + 8 + 8 + 8 + 8 (allow one too few or one too many 8's if repeated addition used)		2	M1	
		Correct answer scores full marks (unless from obvious incorrect working)	7		A1	
						Total 5 marks

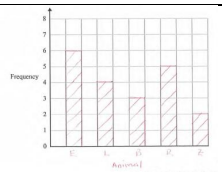
7	(a)		12*ac*	1	B1	
	(b)		5*d* – 2*e*	2	B2	for 5*d* – 2*e* oe (B1 for 5*d* or – 2*e*)
	(c)	4*x* = 23 + 7 **or** 4*x* = 30 oe **or** $x - \frac{7}{4} = \frac{23}{4}$ **or** (23 + 7) ÷ 4 **or** 30 ÷ 4		2	M1	for a correct first step **or** a correct calculation for *x*
		Correct answer scores full marks (unless from obvious incorrect working)	7.5		A1	oe eg $\frac{15}{2}$, $7\frac{1}{2}$, $\frac{30}{4}$
						Total 5 marks

8	(a)		97	1	B1	
	(b)		43	1	B1	
	(c)	16 **or** 125		2	M1	for sight of 16 **or** 125
		Correct answer scores full marks (unless from obvious incorrect working)	2000		A1	
						Total 4 marks

7	1620 × 0.9(0) (= 1458)		4	M1
	1620 ÷ 1.08 (= 1500)			M1
	"1500" – "1458"			M1
	Correct answer scores full marks (unless from obvious incorrect working)	42		A1
				SC B1 for 1620 ÷ 0.9 (= 1800) **and** 1620 × 1.08 (= 1749.6(0)) or for "1800" – "1749.6(0)" (= 50.4(0))
				Total 4 marks

8	(a)	3 × 25 + 30 + 42 or 75 + 30 + 42		2	M1
		Correct answer scores full marks (unless from obvious incorrect working)	147		A1
	(b)	220 – 65 − 30 (= 125) or 220 – 95 (= 125)		3	M1
		"125" ÷ 25 or 5 × 25 (= 125)			M1
		Correct answer scores full marks (unless from obvious incorrect working)	5		A1
					Total 5 marks

9	(a)		60	1	B1 cao
	(b)(i)		58	1	B1
	(ii)		correct reason	1	B1 for <u>angles</u> in a <u>triangle</u> add up to 180° or for angles in a <u>triangle</u> add up to <u>180°</u>
					Total 3 marks

Question		Working	Answer	Mark	Notes
2*	(a)	elephant – 6 lion – 4 buffalo – 3 rhinoceros – 5 zebra - 2	Correct list of frequencies 6, 4, 3, 5, 2	2	B2 for all correct frequencies (ignore tally column) (B1 for 3 or 4 correct frequencies or for 4 or 5 tallies correct but not totalled or for frequencies written as probabilities with 3 or 4 or 5 correct numerators)
	(b)		A correctly labelled bar chart	3	B2 B2ft for all 5 correct bars, ft their figures (Do not follow through 0) (B1ft for 3 or 4 correct bars, ft their figures, (Do not follow through 0) or for 5 correct indications of heights, eg, cross, dot, etc. (Do not follow through 0)) NB Condone gaps of different widths or no gaps between bars and also bars of different widths B1 for all 5 bars labelled – use of initials or a key is acceptable
					Total 5 marks

Question		Working	Answer	Mark	Notes
3	(a)		$4d$	1	B1 allow $d4$
	(b)		w^5	1	B1 cao
	(c)		7	1	B1 cao
	(d)		$10r + 5y$	2	B2 for $10r + 5y$ (B1 for $10r$ or for $(+)5y$)
					Total 5 marks

Question		Working	Answer	Mark	Notes
3	i		(triangular) prism	1	B1
	ii		5	1	B1
	iii		6	1	B1
4	a		6.5	1	B1
	b		8000	1	B1
	c	6 × 1000 (=6000) **or** 475 ÷ 1000 (=0.475) 6 × 1000 ÷ 475 **or** 6 ÷ (475 ÷ 1000) **or** 12.6(3…) **or** 475 × 12 (=5700) **or** 475 × 13 (=6175)	12	3	M1 M1 or for repeated subtraction of 475 from 6000 **or** repeated addition of 475 (may work in grams or kg) A1 cao SC : B2 for an answer of 13
5	a		$11x$	1	B1
	b		$20ef$	1	B1
	c		3	1	B1
	d		17	1	B1
	e		$7t + 6d$	2	B2 B1 for $7t$ **or** (+) $6d$

Question		Working	Answer	Mark	Notes
10			Correct triangle	2	B 2 For a fully correct triangle or B1 for $BAC = 55° \pm 2°$ or $AC = 7$ cm ± 2 mm
11	(a)		$x(3x - 1)$	1	B1
	(b)		$8y + 12$	1	B1
	(c)	$5 \times -3 + 4 \times 6$ or for -15 or $(+)24$	9	2	M1 oe A1
	(d)	$3 \times (-4)^2 + 7 \times -4$ or for $(+)48$ or for -28	20	2	M1 oe A1
12		9×3 (=27) or 8×5 (=40) or 3×4 (=12) or 9×8 (=72) or 5×5 (= 25) or 4×5 (= 20) $9 \times 3 + 5 \times 5$ or $5 \times 8 + 3 \times 4$ or $9 \times 8 - 5 \times 4$ (= 52) '52' ÷ 14 (=3.714....) '4' × 9.59	38.36	5	M1 For correct method to find area of a relevant rectangle M1 For a fully correct method to find the area of the floor M1 For a correct method to find number of tins of polish needed M1 Method to find total cost - must be a whole number of tins rounded up A1
13	(a)	$7x - x = -18 - 3$ ($6x = -21$) oe	-3.5	2	M1 Collect terms in 'x' on one side and number terms on the other. A1
	(b)	$7w = t - 3$ oe	$w = \frac{t-3}{7}$	2	M1 Isolating term in w A1 Must have $w =$
	(c)		$T = 2p + 3r$	3	B3 For $T = 2p + 3r$ oe (B2 for $2p + 3r$ or $T = 3p + r$ or $T = p + 2r$ or $T = 3p + 2r$) (B1 for $2p + r$ or $p + 3r$ or $3p + 2r$ or or $3p + r$ or $p + 2r$)

7	(a)		$5cd$	1	B1	
	(b)		7	1	B1	
	(c)		4	1	B1	
	(d)		$6k + 11m$	2	B2	If not B2 then award B1 for $6k$ **or** $11m$
	(e)		$12g + 4$	1	B1	
						Total 6 marks

8				Europe	Africa	Asia	Total	B4 for all 12 correct values. If not B4 then award (B3 for 9 or 10 or 11 correct values) (B2 for 6 or 7 or 8 correct values) (B1 for 4 or 5 correct values)
			Male	10	**3**	**16**	**29**	
			Female	**14**	6	11	31	
				24	**9**	27	**60**	
								Total 4 marks

Question		Working	Answer	Mark	Notes
12	(a)	65 × 14 + 44 oe eg 910 + 44		2	M1
		Working not required, so correct answer scores full marks (unless from obvious incorrect working)	954		A1
	(b)	750 – 44 (= 706)		4	M1
		"706" ÷ (65 + 12.5) (= 9.109...)			M1 dep or clearly adding at least 5 lots of (65 + 12.5) (77.5, 155, 232.5, 310, 387.5, 465, 542.5, 620, 697.5)
		"706" – "9" × (65 + 12.5) oe eg "706" – 697.5			M1 For the sum of (65 + 12.5) to the value under "706" with no more than one error **and** subtracting from "706"
		Working not required, so correct answer scores full marks (unless from obvious incorrect working)	8.5[0]		A1
		Alternative method for (b)			**Total 6 marks**
		750 ÷ (65 + 12.5)(=9.677…) oe		4	M1
		750 – "9" × (65 + 12.5) (= 52.5) oe			M1
		52.5 – 44			M1
		Working not required, so correct answer scores full marks (unless from obvious incorrect working)	8.5[0]		A1

6	(a)		(1, 4)	1	B1	
	(b)	180 + "68" or 360 – "112"		2	M1	accept 66° to 70° or 110° to 114° seen or used.
			248		A1	accept 246° to 250°
	(c)		5.4	1	B1	accept 5.2 cm to 5.6 cm ignore answer line if 1dp answer given on diagram or in space.
	(d)		27	1	B1ft	ft "*their* c" × 5 if B1 awarded in part (c)
	(e)		2 hr 20 min	2	B1 B1	for 2 hours for 20 minutes if no marks awarded, SC B1 for eg 1hr 80min or 140min
						Total 7 marks

7	(a)		4	1	B1	
	(b)		24*ab*	1	B1	accept *ab*24 etc. but no × signs
	(c)	$8w + w$ or $-4y$ (+) $-3y$		2	M1	M1 for $9w$ or $-7y$
			$9w - 7y$		A1	
	(d)		$4(4 + 3t)$ oe	2	B2	if not B2 then B1 for $2(8 + 6t)$
						Total 6 marks

16	(a)		a^{11}	1	B1
	(b)		w^{12}	1	B1
	(c)		$64x^{10}y^6$	2	B2 if not B2 then award B1 for 2 correct parts as part of a product eg $kx^{10}y^6$ where $k \neq 64$ **or** $64x^{k}y^6$ where $k \neq 10$ **or** $64x^{10}y^{k}$ where $k \neq 6$
	(d)	$c + 8v = t^3$		2	M1
			$t = \sqrt[3]{c+8v}$		A1 oe SCB1 for an answer of $t = \frac{c+8v}{3}$ oe
					Total 6 marks

17	196 ÷ (9 – 5) (= 49) oe		3	M1
	3 × "49"			M1
		147		A1 SCB1 for an answer from 34.5 – 34.6 **or** an answer of 42
				Total 3 marks

18	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

15	(a)		3	1	B1
	(b)		$8x - x^2$	1	B1 or $-x^2 + 8x$
	(c)	$5 \times 4.2 - 6 \times -2.5$ **or** $21 - -15$ **or** 21 + 15 oe		2	M1
			36		A1
	(d)	$k - t = 2g$ or $\frac{k}{2} = g + \frac{t}{2}$ or $\frac{k-t}{2}$		2	M1 for isolating terms in g **or** for correctly dividing by 2.
			$g = \frac{k-t}{2}$		A1 oe e.g. $g = \frac{k}{2} - \frac{t}{2}$
					Total 6 marks

7	6 × 220 (= 1320) or 220 + 220 + 220 + 220 + 220 + 220 (= 1320) oe		4	M1 Allow a **correct** build-up method	
	5000 – "1320" (= 3680) or 5000 – ("220 + 220 + 220 + 220 + 220 + 220") (= 3680) oe or 5000 – 140 (= 4860) or 5000 – ("1320" + some multiples of 295) oe			M1 Allow a **correct** build-up method	
	("4860" – "1320") ÷ 295 or "3540" ÷ 295 or ("3680" – 140) ÷ 295			M1 Allow a **correct** build-up method	M1 A1 for 3680 ÷ 295 (= 12.4(745..)) **and** 12
		12		A1	
				Total 4 marks	

8	(a)		$7g - 2e$	2	B2 or $-2e + 7g$ If not B2 then award B1 for $7g$ or $-2e$
	(b)	3 × 12 (= 36) and 5 × 4 (= 20)		2	M1
			16		A1 SC B1 for an answer of 56 or –16
	(c)	$4p = 24 - 9$ or $4p = 15$ or $p + \frac{9}{4} = \frac{24}{4}$ oe or (24 – 9) ÷ 4 or 15 ÷ 4		2	M1 for a correct first step **or** for a calculation for p
			$\frac{15}{4}$		A1 oe e.g. 3.75 or $3\frac{3}{4}$
					Total 6 marks

4	(a)		$9y$	1	B1
	(b)		$12p^2$	1	B1
	(c)		6	1	B1
	(d)		-1	1	B1
	(e)		$6c + 2d$	2	B2 for $6c + 2d$ or $2d + 6c$ (B1 for $6c$ or $2d$)
					Total 6 marks

5	15 – 6.90 (= 8.10) or 1500 – 690 (= 810)		3	M1
	"8.10" ÷ 0.55 (= 14.727…) or "810" ÷ 55 (= 14.727…) or 15			M1
	Correct answer scores full marks (unless from obvious incorrect working)	14		A1
				Total 3 marks

5	(a)		$4p$	1	B1	
	(b)		$12e + 4f$	2	B2	B1 for $12e$ or $4f$
	(c)		6	1	B1	cao
	(d)	$4y = 43 - 7$ oe **or** $\frac{4y}{4} + \frac{7}{4} = \frac{43}{4}$ oe **or** $(43 - 7) \div 4$		2	M1	for a correct first step to solve the equation **or** a complete calculation for finding the value of y
		Correct answer scores full marks (unless from obvious incorrect working)	9		A1	
						Total 6 marks

6	(a)	0.01×750 oe		2	M1	for a complete method
		Correct answer scores full marks (unless from obvious incorrect working)	7.5		A1	oe eg $\frac{15}{2}$, $7\frac{1}{2}$
	(b)	eg $(2000 \div 400) \times 125$ **or** $2000 \div (400 \div 125)$		2	M1	for a complete method
		Correct answer scores full marks (unless from obvious incorrect working)	625		A1	cao
						Total 4 marks

7	35 × 14 (= 490)			4	M1
	679 – "490" (= 189)	M2 for (679 –) 9 × 21 oe or (490 +) 9 × 21 oe			M1
	"189" ÷ 21				M1
	Working not required, so correct answer scores full marks (unless from obvious incorrect working)		9		A1
					Total 4 marks

8	(a)		$4x - 3y$	2	B2 Accept $-3y + 4x$ (If not B2 then award B1 for $4x$ or $-3y$)
	(b)	4 × 13 **and** ±6 × 7 or 52 **and** ±42		2	M1
		Working not required, so correct answer scores full marks (unless from obvious incorrect working)	10		A1 SC B1 for –50
	(c)	$5p = 28 - 11$ or $11 - 28 = -5p$ or $5p = 17$ or $p + \frac{11}{5} = \frac{28}{5}$ or (28 – 11) ÷ 5 oe		2	M1
		Working not required, so correct answer scores full marks (unless from obvious incorrect working)	$\frac{17}{5}$		A1 oe e.g. 3.4 or $3\frac{2}{5}$
					Total 6 marks

8	(a)			$11m - 3k$	2	B2 If not B2 then award B1 for either $11m$ or $-3k$
	(b)	$2 \times 5 + 3 \times 8$ **or** $10 + 24$			2	M1 for substituting the values of a and b into P
				34		A1
	(c)	$16 = 2a + 3 \times 20$ **or** $16 = 2a + 60$	$P - 3b = 2a$		3	M1 for substituting the values of P and b into the equation **or** rearranging the equation $P = 2a + 3b$ for $2a$ correctly
		$16 - 60 = 2a$ $-44 = 2a$ oe **or**	$16 - 2 \times 30 = 2a$ **or** $16 - 60 = 2a$			M1 for rearranging the equation for $2a$ correctly **or** substituting the values of P and b into the correctly rearranged equation
				-22		A1
						Total 7 marks

9		240 ÷ 3 (= 80) **or** 240 ÷ 3 × 2 (= 160)		4	M1 for finding the number of large ice creams or small ice creams
		'80' × 3.8 (= 304)			M1 for finding the cost of large ice creams
		(640 – '304') ÷ '160'			M1 for a complete method to find the cost of a small ice cream
			2.1(0)		A1
					Total 4 marks

10	(a)	16 : 40 or 8 : 20 or 4 : 10		2	M1 for any correct cancelling or 5 : 2
			2 : 5		A1 cao
	(b)		$\frac{5}{12}$	1	B1
					Total 3 marks

6	a		$15rt$	1	B1	oe
	b	eg $(x =)\ (27 - 5) \div 4$			M1	complete method
			5.5	2	A1	oe
	c	$7 \times 2 - 5 \times 4$			M1	
			-6	2	A1	
	d	$2 \times (-3)^2 - 5$			M1	
			13	2	A1	
						Total 7 marks

7	a		BG, BO, BP, RG, RO, RP, YG, YO, YP	2	B2	all 9 combinations given with no extras or repeats
					(B1)	at least 5 correct combinations given, condone repeats and incorrect combinations
	b		$\frac{1}{3}$	1	B1	oe,ft from (a), accept 0.33(33…)
	c				M1	for $\frac{7}{a}$ where $a > 7$ or $\frac{b}{20}$ where $b < 20$
			$\frac{7}{20}$	2	A1	oe
						Total 5 marks

9 (a)	$3 \times 4 + 2 \times 7$ **or** $12 + 14$		2	M1	
		26		A1	
(b)	$2 \times (-6)^2 + 3 \times -2$ **or** $72 - 6$ **or** $2 \times -6 \times -6 + 3 \times -2$		2	M1	
		66		A1	
(c)		$T = 6g + 12h$	3	B3	for $T = 6g + 12h$ oe (B2 for $6g + 12h$ oe **or** $T = 6g + ah$ **or** $T = bg + 12h$ **or** $T = 12g + 6h$ oe) (B1 for $6g + ah$ **or** $bg + 12h$ **or** $12g + 6h$ **or** for an incorrect expression in g and h eg $T = g + h$)
					Total 7 marks

10 (a)	$\frac{88.96}{7.48...}$		2	M1	for 88.96 **or** 7.48…**or** for an answer of 11.9 or better
		11.88778…		A1	11.88778(004)
(b)		12	1	B1	ft provided (a) has at least 3 sig figs
					Total 3 marks

11	$2 \times \pi \times 18$ **or** $\pi \times 36$		2	M1	
		113		A1	for 113 – 113.15
					Total 2 marks

8	(a)	20 + 45 or 20 + 9 × 5		2	M1	
			65		A1	
	(b)	164 – 20 (= 144)		3	M1	
		'144' ÷ 9 (= 16)			M1	
			16		A1	cao
	(c)			2	M1	for $T = an + 20$ or $T = 9n + k$ or $9n + 20$
			$T = 9n + 20$		A1	for $T = 20 + 9n$ or $T = 9n + 20$
						Total 7 marks

9	(a)		28	1	B1	cao
	(b)		18	1	B1	cao
	(c)		0.85	1	B1	cao
	(d)	$\frac{45}{60}, \frac{24}{60}, \frac{28}{60}, \frac{40}{60}$ or 0.75, 0.4, 0.466…, 0.666… or 75%, 40%, 46.6%, 66.6%		2	M1	for a method to compare the fractions If M0, award B1 for any three of these fractions in the correct order or for all fractions (or dec or perc) in correct reverse order
			$\frac{2}{5}, \frac{7}{15}, \frac{2}{3}, \frac{3}{4}$		A1	allow answers in any form (dec or perc)
	(e)	$\frac{36}{96}$ oe		2	M1	for fraction or for partial simplification.
			$\frac{3}{8}$		A1	cao correct answer scores full marks
						Total 7 marks

Question		Working	Answer	Mark	Notes
8	(a)		w^5	1	B1
	(b)		$15ac$	1	B1 or $a15c$ or $ac15$ or $c15a$ oe (NB: no multiplication signs)
	(c)		$2e + 7f$	2	B2 ($2e$ **or** $+7f$ or $7f$ but not for $-7f$) Do not isw so if you see $2e + 7f = 9ef$ award B1 only
	(d)	eg $5x - x = 12 + 7$ **or** $-7 - 12 = x - 5x$ **or** $4x - 7 = 12$ **or** $5x = x + 19$ oe		3	M1 for rearrangement with x terms on one side and numerical terms on the other in a correct equation **or** the correct simplification of x terms or numbers on one side in a correct equation
		$4x = 19$ **or** $-4x = -19$			M1 x terms simplified and number terms simplified correctly in an equation
		Working required	4.75		A1 oe, eg $\frac{19}{4}$ or $4\frac{3}{4}$ dep on M1
					Total 7 marks

11	(a)		c^6	1	B1	
	(b)		$6h^3$	1	B1	
	(c)		$x^2 + 5x$	1	B1	
	(d)		$3(3y - 4)$	1	B1	
	(e)		$T = 15m + 40p$	3	B3	((B2 for $15m + 40p$ or $T = 15m + xp$ or $T = ym + 40p$ or $T = 40m + 15p$) (B1 for $15m + xp$ or $ym + 40p$ or $40m + 15p$ or for T = an incorrect expression in m and p eg $T = mp$)) Allow $15 \times m$ or $m15$ etc
						Total 7 marks

12	1342 ÷ 11(=122) or 125 × 11 (=1375)		3	M1	
	125 – "122" (=3) or "1375" – 1342(=33)			M1	
		3 euros or 33 (Swedish) Krona		A1	Answer **must** have correct units which may be shortened eg € or SK or krona
					Total 3 marks

13		*BO, BA, BW,* *FO, FA, FW,* *CO, CA, CW*	2	B2	B2 all correct combinations with no repeats or errors (B1 for at least 4 correct combinations ignoring repeats)
					Total 2 marks

Question		Working	Answer	Mark	Notes
24	(a)		1	1	B1
	(b)		$27a^6b^{12}$	2	B2 (B1 for 2 of 3 parts in a product)
	(c)		$7x^2y^2(2y^2+3x)$	2	B2 B1 for a correct factorisation with at least 2 factors outside (eg $7x$, x^2, xy, etc) eg $7x(2xy^4+3x^2y^2)$ eg $x^2y^2(14y^2+21x)$ or for the correct common factor with just one mistake inside the bracket eg $7x^2y^2(2y+3x)$ which is missing the squared on the y term
	(d)	$y = mx + 4$ where $m \neq 0$ oe (eg $y = 2x + 4$) **or** $y = -2x + c$ or $y + 2x = c$ oe **or** $-2x + 4$ or $f(x) = -2x + 4$ oe		2	M1
		Correct answer scores full marks (unless from obvious incorrect working)	$y = -2x + 4$		A1 oe eg $y + 2x = 4$
					Total 7 marks

7	(a)		45*cd*	1	B1 oe Allow 45*dc*, *c*45*d*, *d*45*c*, *cd*45 or *dc*45 Allow upper case letters
	(b)		$-2p + 8n$	2	B2 oe eg. $8n - 2p$ If not B2 then award B1 for $-2p$ or $8n$
	(c)	8×9 and $(-)6 \times 5$ oe or 72 and ±30 oe		2	M1
			42		A1 SCB1 for −14
	(d)	$5m = 17 + 6$ or $5m = 23$ or $m - \frac{6}{5} = \frac{17}{5}$ or $m - 1.2 = 3.4$ or $-17 - 6 = -5m$ or $-23 = -5m$ or (17 + 6) ÷ 5 oe		2	M1 for a correct first step or a calculation for *m*
		4 – 3	$\frac{23}{5}$		A1 oe eg. 4.6 Allow 4,6
					Total 7 marks

8		AE, AP, AW, EP, EW, PW	2	B2 for all combinations with no repeats or incorrect combinations (Allow lower case letters) If not B2 then award B1 for at least 4 correct combinations (ignore repeats or incorrect combinations)
				Total 2 marks

9	360 – 296 (= 64)		4	M1 allow angles on the diagram
	180 – (“64” + 42) (= 74)			M1
	(180 – (“64” + 42)) ÷ 2 or “74” ÷ 2			M1
		37		A1
				Total 4 marks

5	(a)		$11d$	1	B1	
	(b)		$10pm$	1	B1 or $10mp$	
	(c)		-24	1	B1 cao	
	(d)		48	1	B1cao	
	(e)		a^4	1	B1 cao	
	(f)	9×8 or 72 **and** $\pm 4 \times 12$ or ± 48		2	M1	
		Correct answer scores full marks (unless from obvious incorrect working)	24		A1 cao SC B1 for 76	
					Total 7 marks	

6	2358 × 0.28 (= 660.24)	2358 × 0.28 (= 660.24)	2358 ÷ 12 (= 196.5)	2358 ÷ 12 (= 196.5)	42 ÷ 0.28 (= 150)	42 × 12 (= 504)		4	M1
	42 × 12 (= 504)	660.24 ÷ 12 (= 55.02)	"196.5" × 0.28 (= 55.02)	42 ÷ 0.28 (= 150)	"150" × 12 (= 1800)	"504" ÷ 0.28 (= 1800)			M1
	"660.24" – "504" or ("55.02" – 42) × 12 oe or ("196.5" – "150") × 12 × 0.28 oe or (2358 – "1800") × 0.28 oe								M1
	Correct answer scores full marks (unless from obvious incorrect working)						156.24		A1
									Total 4 marks

4	(a)		0.9	1	B1
	(b)		6	1	B1
	(c)		15 squares shaded	1	B1
	(d)		$\frac{2}{500}$	1	B1
	(e)	eg $\frac{32-8}{32}$ oe or $1-\frac{8}{32}$ oe or $\frac{32}{32}-\frac{8}{32}$ oe or $\frac{24}{32}$ or 0.75 or $\frac{1}{4}$		2	M1
		Correct answer scores full marks (unless from obvious incorrect working)	$\frac{3}{4}$		A1
					Total 6 marks

5	(a)		$28ef$	1	B1
	(b)		d^5	1	B1
	(c)		$4a - 5k$	2	B2 for $4a - 5k$ (B1 for $4a$ or $-5k$ **or** $4a + -5k$)
	(d)		9	1	B1
	(e)	$2r = 14 + 9$ or $2r = 23$ oe **or** $(14 + 9) \div 2$ **or** $2 \times 11.5 - 9 = 14$		2	M1 for a correct first step **or** a correct calculation for r
		Correct answer scores full marks (unless from obvious incorrect working)	11.5		A1 for 11.5 or $\frac{23}{2}$ or $11\frac{1}{2}$
					Total 7 marks

13	(a)		$5(3 - x)$	1	B1
	(b)	$35 = 5 \times p + 7 \times 2$ **or** $5p = d - 7r$ **or** $\frac{d}{5} = p + \frac{7}{5}r$ oe		3	M1 oe for a correct substitution in an equation **or** for a correct first step in re-arranging
		$5p = 35 - \text{“}14\text{”}$ **or** $5p = 21$ **or** $-5p = -35 + \text{“}14\text{”}$ **or** $-5p = -21$ **or** $(p =) \frac{35 - \text{"}14\text{"}}{5}$ **or** $(p =) \frac{-35 + \text{"}14\text{"}}{-5}$ oe			M1 oe for rearranging to find the value of $5p$ **or** the value of $-5p$ **or** a complete method to find the value of p
		Correct answer scores full marks (unless from obvious incorrect working)	$\frac{21}{5}$		A1 oe eg 4.2
	(c)(i)		$m + n$	1	B1 oe condone $s + l$
	(ii)		$12m + 25n$	2	B2 for final answer $12m + 25n$ **or** $25n + 12m$ (B1 for $12m$ or $25n$) For B2 or B1, condone use of s and l for m and n respectively
					Total 7 marks

5	(a)		14	1	B1	Allow −14
	(b)		18	1	B1	Allow −18
	(c)		−12	1	B1	
						Total 3 marks

6	(a)		tangent	1	B1	
	(b)		Radius drawn	1	B1	Intention clear – do not accept diameter
	(c)		230	1	B1	
						Total 3 marks

7	4 × 2.40 + 1.20 + 5.75 (= 16.55)		3	M1	**or** subtracting 2 of 4 × 2.40, 1.20, 5.75 from 20 **or** 20 – 5.75 (= 14.25) **and** 4 × 2.40 + 1.20 (= 10.8(0))
	20 – (4 × 2.40 + 1.20 + 5.75) (= 3.45)			M1	**or** "14.25" – "10.8(0)" (= 3.45)
		1.15		A1	
					Total 3 marks

8	(a)		$4a$	1	B1	
	(b)		$15c^2$	1	B1	
	(c)		$8e + 3g$	2	B2	B1 for $8e$ or $3g$ seen
	(d)		23	1	B1	
	(e)		$5(y + 3)$	1	B1	
	(f)	$H + w = 3y$ **or** $-H - w = -3y$ **or** $\frac{H}{3} = y - \frac{w}{3}$		2	M1	
			$y = \frac{H + w}{3}$		A1	oe e.g. $y = \frac{-H - w}{-3}$, $y = \frac{H}{3} + \frac{w}{3}$
						Total 8 marks

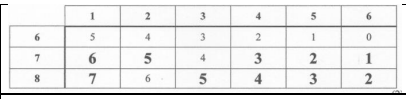
					Total 6 marks

9	(a)	e.g. $x + 2$ **or** $3x + 6$ **or** $3(x + 2)$			M1
		e.g. $x + x + 2 + 3x + 6$ **or** $5x + 8$ **or** $x + x + 2 + 3(x + 2)$			M1 dep
			$T = 5x + 8$	3	A1 accept $T = 8 + 5x$ (SC B2 $T = 5x + a$ where a ≠ 0 **or** $T = bx + 8$ where $b \neq 0$)
	(b)	e.g. r – 7 = 4g or $\frac{r}{4} = g + \frac{7}{4}$ **or** $-4g = 7 - r$ or $-g = \frac{7-r}{4}$ **or** $-g = \frac{r-7}{4}$ oe **or** $\frac{r-7}{4}$ oe			M1 for a first step of subtracting 7 **or** dividing by 4 in a correct equation
			$g = \frac{r-7}{4}$	2	A1 oe
	(c)	e.g. $6y - 2y = 8 + 3$ **or** $2y - 6y = -3 - 8$ oe e.g. $4y - 3 = 8$ **or** $6y = 2y + 11$ **or** $-3 = -4y + 8$ **or** $6y - 11 = 2y$			M1 for correct rearrangement with y terms on one side and numbers on the other side e.g. $6y - 2y = 8 + 3$ or for the correct simplification of either y terms or numbers on one side in a correct equation e.g. $4y - 3 = 8$ or $6y = 2y + 11$
		e.g. $4y = 11$ **or** $-4y = -11$ **or**			M1 for correct rearrangement with y terms on one side and numbers on the other **and** correct simplification of terms on both sides **or** for $4y - 11 = 0$ **or** for $11 - 4y = 0$

			$\frac{11}{4}$	3	A1 dep on M1 accept 2.75 or $2\frac{3}{4}$ oe Award full marks for a correct answer if at least 1 method mark awarded **If no correct algebraic working then award no marks**
					Total 8 marks
10	(a)		Triangle drawn with correct intersecting arcs 7 cm from A and 7 cm from B	2	B2 for triangle drawn with correct intersecting arcs 7 cm from *A* and 7 cm from *B* within the overlay (B1 for two intersecting arcs within the overlay **or** accurate triangle drawn with no arcs)
	(b)	Two pairs of intersecting arcs with equal radius centre *D* and *E*			M1 for arcs that intersect within guidelines **or** correct perpendicular bisector without arcs.
			Correct bisector with arcs	2	A1
					Total 4 marks

7	(a)		$6p$	1	B1	
	(b)		$8y^2$	1	B1	
	(c)		e^5	1	B1	
	(d)		$20cd$	1	B1	
	(e)		26	1	B1	
	(f)	$424 = 4n$		2	M1	For 424 or 324 + 225 –125 with at most one error
			106		A1	SCB1 for 524 or 674
	(g)		$3(3t – 2)$	1	B1	
						Total 8 marks

8		3 kg = 3000 g or 150 g = 0.15 kg or 180 g = 0.18 kg or 1350 g = 1.35(0) kg		3	B1	may be seen used as part of a calculation
		3 × 150 + 5 × 180 (= 1350) 3 × 0.15 + 5 × 0.18 (=1.35(0))			M1	Could use their converted values
			1650		A1	
						Total 3 marks

9	(a)			2	B2	B2 for all scores completed correctly. B1 for 6, 7, 8 or 9 scores completed correctly
	(b)		$\frac{15}{18}$	1	B1ft	oe ($\frac{5}{6}$ or 0.83(33...) or 83.(33..)%) ft from complete table
	(c)		$\frac{9}{18}$	1	B1ft	oe Penalise incorrect notation once only ft from complete table
						Total 4 marks

11	(a)		e^5	1	B1
	(b)		$3m$	1	B1
	(c)		$6g^2$	1	B1
	(d)		$a^2 + 8a$	1	B1
	(e)		$5(3x + 4)$	1	B1
	(f)		$T = 3d + 5h$	3	B3 Allow $T = d3 + h5$ or $T = d \times 3 + h \times 5$ (B2 for $3d + 5h$ or $T = 3d + xh$ or $T = yd + 5h$ or $T = 5d + 3h$) [where $x \neq 0$ and $y \neq 0$ and can be negative] (B1 for $3d + xh$ or $yd + 5h$ [where $x \neq 0$ and $y \neq 0$ and can be negative] or $5d + 3h$ or for T = an incorrect expression in d and h eg $T = d + h$, $T = d \times h$ etc or $T = 3d$ (+ c) or $T = (k +) 5h$))
					Total 8 marks

9	(a)		c^3	1	B1	
	(b)		$36de$	1	B1	oe
	(c)		28	1	B1	
	(d)	$2g = 6 + 3$ or $2g = 9$ or $g - \frac{3}{2} = \frac{6}{2}$ oe or $(6 + 3) \div 2$ or $9 \div 2$		2	M1	
		Working not required, so correct answer scores full marks (unless from obvious incorrect working)	4.5		A1	oe eg $\frac{9}{2}$ or $4\frac{1}{2}$ or 4,5
	(e)		$x^2 - 4x$	1	B1	or $-4x + x^2$
	(f)	e.g. $4\times(-3)^2 + 2$ or $4(-3)^2 + 2$ or $4 \times 9 + 2$ or $4(9) + 2$ or $4 \times -3 \times -3 + 2$ or $4(-3 \times -3) + 2$		2	M1	for substituting values for y and w
		Working not required, so correct answer scores full marks (unless from obvious incorrect working)	38		A1	
						Total 8 marks

10		Correct square	2	B2	For a fully correct square with arcs shown (B1 for a correctly sized square with no arcs shown **or** for an incorrect quadrilateral with arcs of equal radius shown **or** correct arcs not joined – all within or on the guidelines of the overlay
					Total 2 marks

16	(a)		$3(2y-9)$	1	B1 accept $3(-9+2y)$
	(b)		p^2-2p	1	B1 accept $-2p+p^2$
	(c)	$46=5\times17+4r$ oe or $46=85+4r$ oe oe or $46-5\times17(=4r)$ oe or $46-85(=4r)$ oe or $r=\frac{T-5g}{4}$		3	M1
		$(r=)\frac{46-85}{4}$ oe or $(r=)\frac{46-5\times17}{4}$ oe			M1
		Correct answer scores full marks (unless from obvious incorrect working)	−9.75		A1 oe eg $\frac{-39}{4}$
	(d)	25 ± ……. **or** ……. – 12 **or** $(-5)^2-4\times3$ or $(-5)^2-4(3)$ or $-5\times-5-4\times3$ or $-5\times-5-4(3)$		2	M1 for either 25 or –12 in the correct place **or** the correct substitution shown with brackets around –5
		Correct answer scores full marks (unless from obvious incorrect working)	13		A1 (M0A0 for −37 without any working)
	(e)	$x^2+5x-7x-35$		2	M1 for any 3 correct terms **or** for 4 out of 4 correct terms ignoring signs **or** for $x^2-2x\ldots$ **or** for $\ldots-2x-35$
		Correct answer scores full marks (unless from obvious incorrect working)	$x^2-2x-35$		A1 oe Ignore solutions/roots if correct expansion seen
					Total 9 marks

6	250 ÷ 14 (= 17.85….) or 17 or 18 or 14 + 14 ….. + 14 (seventeen or eighteen times) oe		3	M1
	17 × 14 (= 238)			M1 This mark assumes previous M1
	Correct answer scores full marks (unless from obvious incorrect working)	12		A1
				Total 3 marks

7	3.5 km = 3500 m or 950 m = 0.95 km or 1.8 km = 1800 m or 1200 m = 1.2 km or 8 km = 8000 m		4	B1 for one correct conversion
	3.5 + "0.95" + 1.8 + "1.2" (= 7.45) or "3500" + 950 + "1800" + 1200 (= 7450)			M1 can gain this mark for adding their converted figures even if incorrect but some attempt must have been made to convert 2 relevant values. (eg incorrect but 350 + 950 + 180 + 1200)
	8 – "7.45" (= 0.55) or 8000 – "7450"			M1ft Correct compatible units ft their total dep on Marion's distance being less than Talha's
	Correct answer scores full marks (unless from obvious incorrect working)	550		A1
				Total 4 marks

8	(a)		$11g - 2h$	2	B2	B1 for one correct term (B1 for $11g + -2h$)
	(b)		$28am$	1	B1	oe
	(c)	$5x = 12 + 7$ oe or $(12 + 7) \div 5$		2	M1	A correct equation with number terms one side and x the other **or** for a correct process to find x
		Correct answer scores full marks (unless from obvious incorrect working)	3.8		A1	oe $\frac{19}{5}$ or $3\frac{4}{5}$
	(d)		$35k + 15$	1	B1	or $15 + 35k$ allow $35x + 15$
	(e)		$3(3y + 4)$	1	B1	allow $3(3y + 4$ or $3(3x + 4)$
	(f)	$3c$ (allow $3 \times c$ or $c3$) or $c + 7$		3	M1	allow $3c + 7$
		$c + 3c + c + 7$			M1	correct unsimplified expression
		Correct answer scores full marks (unless from obvious incorrect working)	$5c + 7$		A1	allow $5 \times c + 7$
						Total 10 marks

9		5 (hours) 50 (minutes)	2	B1, B1
				Total 2 marks

Q		Working	Answer	Mark	Notes
13	(a)		e^6	1	B1 cao
	(b)	$x^2 - 3x + x - 3$		2	M1 for any 3 correct terms **or** for 4 out of 4 correct terms ignoring signs **or** for $x^2 - 2x \ldots$ **or** for $\ldots -2x - 3$
		Correct answer scores full marks (unless from obvious incorrect working)	$x^2 - 2x - 3$		A1
					Total 3 marks

14	$30^2 + h^2 = 52^2$ oe or $900 + h^2 = 2704$ $(h^2 =) 52^2 - 30^2 (= 1804)$ or $(h^2 =) 2704 - 900 (= 1804)$		3	M1 for applying Pythagoras theorem correctly
	$(h =) \sqrt{52^2 - 30^2}$ $(= \sqrt{1804})$ (= 42.47352..) or $(h =) \sqrt{2704 - 900}$ $(= \sqrt{1804})$ (= 42.47352..)			M1 for square rooting
	Correct answer scores full marks (unless from obvious incorrect working)	42.5		A1 awrt 42.5 or allow $2\sqrt{451}$
				Total 3 marks

23	(a)		$4x^2 - 20x$	1	B1	or $-20x + 4x^2$
	(b)	$(y \pm 5)(y \pm 4)$ or $(5 \pm y)(4 \pm y)$ or $y(y-4)-5(y-4)$ or $y(y-5)-4(y-5)$		2	M1	for $(y \pm 5)(y \pm 4)$ **or** $(5 \pm y)(4 \pm y)$ **or** for $(y + a)(y + b)$ where $ab = 20$ or $a + b = -9$
		Correct answer scores full marks (unless from obvious incorrect working)	$(y - 5)(y - 4)$		A1	oe Allow any letter for y Accept $(5 - y)(4 - y)$
						Total 3 marks

24	(a)		0.0056	1	B1	
	(b)	20 000 000 oe eg 20×10^6 or 0.2×10^8 **or** 2×10^n $n \neq 7$ **or** $\frac{6\times10^{(3+5)}}{21+9}$ **or** $\frac{6\times10^8}{30}$ **or** $\frac{6\times10^3}{3\times10^{-4}}$ **or** $\frac{6000}{0.0003}$ **or** $\frac{6000}{3\times10^{-4}}$		2	M1	
		Correct answer scores full marks (unless from obvious incorrect working)	2×10^7		A1	
						Total 3 marks

Question	Working	Answer	Mark	Notes
23	360 ÷ 8 (= 45) or 180 – (360 ÷ 8) (= 135) or $\frac{6\times180}{8}$ (=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
24	1 + 0.65 + 1.22 (=2.87) or 100 + 65 + 122 (=287) 861 ÷ 2.87 or (861 ÷ 287) × 100 oe	300	3	M1 oe Note: 863÷3=287 is M0 M1 A1
25 (a)		$4d^2e(3+4e)$	2	B2 B1 for correct partial factorisation with at least one correct factor
(b)		$3k^3m$	2	B2 B1 for an answer in the form ak^xm^y with 2 correct from $a = 3$, $x = 3$, $y = 1$

12	(a)		Reflection	2	B1	for reflection with no mention of translate, enlarge, rotate, move
			$x = -1$		B1	for $x = -1$ with no mention of a vector, SF, centre or angle
	(b)		Triangle drawn with vertices at (4, 2) (4, 8) (8, 2)	2	B2 (B1	for a correct enlargement for an enlarged triangle scale factor 2 in wrong position **or** 2 out of out 3 vertices in the correct position)
						Total 4 marks

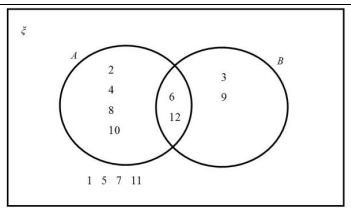
13	(a)		$3(2x - 5)$	1	B1
	(b)		$T = 200c - 50d$	3	B3 for $T = 200c - 50d$ oe (B2 for $T = 200c + kd$ **or** $T = kc - 50d$ **or** $200c - 50d$) (B1 for $200c$ **or** $-50d$ **or** $50d$ **or** $T = kc + pd$ where $k \neq 0$ or 200 and $p \neq 0$ or ± 50)
					Total 4 marks

Question		Working	Answer	Mark	Notes
7	(a)		7^5	1	B1
	(b)	$64=8^2$ **or** $64=4^3$ **or** $\sqrt{64}=8$ **or** $\sqrt[3]{64}=4$ **or** 8 × 8 = 64 **or** 4 × 4 × 4 = 64 **or** 1, 4, 9, 16, 25, 36, 49, 64 **or** 1, 8, 27, 64		2	M1
			$64=8^2$ and $64=4^3$		A1 or $\sqrt{64}=8$ and $\sqrt[3]{64}=4$ or correct list of square & cube numbers to 64
	(c)		1331	1	B1
	(d)		9.9	1	B1
					Total 5 marks

8	(a)	25 – 4 × – 3 **or** 25 – – 12 **or** 25 + 12		2	M1 Correct substitution
			37		A1
	(b)	$2x^2 + x$		3	M1
		(+)$3x$ – 6			M1 indep
			$2x^2 + 4x + 1$		A1 cao
					Total 5 marks

21	(a)		$5y^3(3y + 4u)$	2	B2	for $5y^3(3y + 4u)$
					(B1	for $5y(3y^3 + 4uy^2)$ **or** $5y^2(3y^2 + 4uy)$ **or** $y^2(15y^2 + 20uy)$ **or** $y^3(15y + 20u)$ **or** $5y^3(\ldots)$ where there is only one mistake in the brackets)
	(b)	$4\times(4-3x)=5-8x$ oe **or** $16-12x=5-8x$ oe **or** $4-3x=\frac{5}{4}-2x$ oe		3	M1	for removal of fraction in a correct equation
		e.g. $16-5=12x-8x$ **or** $11=4x$ oe **or** $4-\frac{5}{4}=3x-2x$			M1	for terms in x on one side **and** numbers on the other side in an equation, allow correct rearrangement of their equation in the form $ax + b = cx + d$
			2.75		A1	(dep on M1) oe e.g. $2\frac{3}{4}$ or $\frac{11}{4}$
						Total 5 marks

22	(a)		2.84×10^9	1	B1
	(b)		0.000 25	1	B1
					Total 2 marks

14	a		Fully correct Venn diagram	3	B3 fully correct Venn diagram (B2 for 2 or 3 sections correct B1 for 1 section correct)
	b				M1 ft from (a) $\frac{'4'}{a}$ where $a \geq 4$ **or** $\frac{b}{12}$ where $b \leq 12$
			$\frac{4}{12}$	2	A1 oe
					Total 5 marks

15	a		$15a + 20$	1	B1	
	b		$2(2c - 7)$	1	B1	
	c	E.g. $5x - x = 6 + 11$ **or** $4x - 11 = 6$ **or** $5x = x + 17$			M1	for correct rearrangement with x terms on one side and numbers on the other **or** the correct simplification of either x terms or numbers on one side in a correct equation
		$4x = 17$ **or** $-4x = -17$			M1	
			4.25	3	A1	oe, dep on at least M1
						Total 5 marks

24	(a)		$5a^4c^3(5c^4d + 9a^5h)$	2	B2	If not B2 then award B1 for any **correct** factorisation with at least 2 of: the 5, a term in a, a term in c, outside the bracket eg $5ac(5a^3c^6d + 9a^8c^2h)$ **or** $a^2c(25a^2c^6d + 45a^7c^2h)$ (NB: not just a^4 etc as we want to know students have considered more than just one letter or the number) **or** the correct common factor **and** a 2 term expression inside the bracket eg $5a^4c^3(5c^4 + 9a^5)$ (this is missing d in first term and h in the second but the common factor is correct)
	(b)	$4x^2 + 10x + 10x + 25 = 4x^2 - 2x + 6x - 3$ $4x^2 + 20x + 25 = 4x^2 + 4x - 3$		3	M1	Correct expansion of $(2x + 5)^2$ **or** $(2x + 3)(2x - 1)$ **or** expansion of **both** sets of brackets with at least 3 of 4 terms correct in both (NB: if written as a 3 term quadratic (and not seen as 4 terms) then the middle term must be correct as it is equivalent to 2 correct terms) (eg (RHS) $4x^2 + 4x + 3$ has 1 error, $2x^2 + 4x - 3$ has 1 error, $4x^2 + 10x - 3$ has 2 errors)
		$10x + 10x - 6x + 2x = -3 - 25$ **or** $3 + 25 = -16x$ **or** $16x = -28$ oe			M1	ft if previous mark awarded. For terms in x on one side and number terms on the other side in a correct ft equation dependent on a linear equation
		Working not required, so correct answer scores full marks (unless from obvious incorrect working eg -1.75 oe from $2x^2 + 20x + 25 = 2x^2 + 4x - 3$ scores M2A0)	-1.75		A1	**or** $-1\frac{3}{4}$ **or** $-\frac{7}{4}$ **or** $-\frac{28}{16}$ **or** $-1\frac{12}{16}$ oe
						Total 5 marks

23	(a)		x^9	1	B1 cao
	(b)		$64y^6$	2	B2 for $64y^6$ (B1 for ky^6 where $k \neq 64$ **or** $64y^m$ where $m \neq 6$)
	(c)	$(n \pm 3)(n \pm 4)$		2	M1 for $(n \pm 3)(n \pm 4)$ or $(n + a)(n + b)$ where $ab = 12$ or $a + b = -7$ Condone use of a different letter to n
			$(n - 3)(n - 4)$		A1
					Total 5 marks

19	$7x + 3x + 8x = 360$ oe		4	M1	M2 for $7x = 140$
	$(x =)\ 360 \div 18\ (= 20)$			M1	(140 can be on diagram)
	$360 \div (180 - 7 \times$ "20") oe or $360 \div (180 -$ "140") $\frac{(n-2)\times 180}{n} = 7 \times$ "20" oe or $360 \div 40$			M1 for $360 \div$ exterior angle	
		9		A1	
				Total 4 marks	

20	(a)	$n^2 - 6n + 4n - 24$		2	M1 for any 3 correct terms **or** for 4 out of 4 correct terms ignoring signs **or** for $n^2 - 2n \ldots$ **or** for $\ldots - 2n - 24$
			$n^2 - 2n - 24$		A1 oe
	(b)	$8x - 12$ **or** $\frac{3}{4}x - \frac{5}{4}$ oe or $0.75x - 1.25$ oe		3	M1 for correct multiplication by 4 **or** separate fractions on the RHS
		$8x - 3x = -5 + 12$ oe or $5x = 7$ oe **or** $2x - \frac{3}{4}x = -\frac{5}{4} + 3$ or $2x - 0.75x = -1.25 - 3$ oe			M1 ft (dep on 4 terms) for terms in x on one side of equation and number terms on the other
			$\frac{7}{5}$		A1 oe dep on M1 1.4 or $1\frac{2}{5}$ oe
					Total 5 marks

23	(a)		$3c^2(6cd^2-7)$	2	B2	fully correct **or** B1 for a correct partial factorisation with at least two terms outside the bracket ie $3c(6c^2d^2-7c)$ or $c^2\left(18cd^2-21\right)$ **or** the fully correct factor outside the bracket with two terms inside the bracket and at most one mistake $3c^2(.....)$
	(b) (i)	eg $(y\pm6)(y\pm3)$ or $y(y+3)-6(y+3)$ or $y(y-6)+3(y-6)$		2	M1	or $(y+a)(y+b)$ where $ab=-18$ **or** $a+b=-3$ or factorisation which expands to give 2 out of 3 correct terms
		[allow use of x rather than y]	$(y-6)(y+3)$		A1	
	(ii)		6, −3	1	B1	ft must come from their factors in (b)(i)
						Total 5 marks

21	(a)	$m^2 - 8m + 5m - 40$		2	M1 for any 3 correct terms from 4 terms **or** for 4 out of 4 correct terms ignoring signs **or** for $m^2 - 3m \ldots$ **or** for $\ldots - 3m - 40$
		Working not required, so correct answer scores full marks (unless from obvious incorrect working)	$m^2 - 3m - 40$		A1
	(b)	$9n - 12 = 5n + 6$ oe **or** $3n - 4 = \frac{5}{3}n + \frac{6}{3}$ oe		3	M1 for removal of fraction **and** multiplying out LHS **or** separating fraction (RHS) in an equation
		$9n - 5n = 12 + 6$ oe or $4n = 18$ or $-12 - 6 = 5n - 9n$ oe or $-4n = -18$ oe or $n = \frac{-18}{-4}$ **or** $3n - \frac{5}{3}n = \frac{6}{3} + 4$ oe			M1 ft (dep on 4 terms) correctly rearranging their 4 term equation for terms in n on one side of equation and number terms on the other
		Working required	$\frac{9}{2}$		A1 dep on M2 oe eg $\frac{18}{4}$ or 4.5 or $4\frac{1}{2}$
					Total 5 marks

14	(a)		$x^2 - 7x$	1	B1	allow $-7x + x^2$
	(b)		$2(4y - 5)$	1	B1	allow $2(-5 + 4y)$
	(c)	eg $48 = 5a + 7 \times 3$ oe **or** $48 = 5a + 21$ oe **or** $(5a =)\ 48 - 7 \times 3\ (= 27)$ oe **or** $(5a =)\ 48 - 21\ (= 27)$ oe **or** $a = \frac{m - 7b}{5}$		3	M1	for substituting into the equation **or** making a the subject of the equation
		$(a =)\frac{48 - 7 \times 3}{5}$ oe **or** $(a =)\frac{48 - 21}{5}$			M1	for a complete method
		Correct answer scores full marks (unless from obvious incorrect working)	5.4		A1	oe eg $\frac{27}{5}$ SCB1 for answer of 261
						Total 5 marks

16		96 ÷ 12 (= 8)		3	M1	for a complete method to find the height of the parallelogram
		$\frac{1}{2}(18+26)\times[8]$			M1	for a method to find the area of the trapezium (do not allow missing brackets unless recovered) where [8] is what they believe to be the height of the trapezium and must be positive. Do not allow [8] to be 12 or 1
		Correct answer scores full marks (unless from obvious incorrect working)	176		A1	
						Total 3 marks

17	(a)		$9c(2-5d)$	2	B2	for $9c(2-5d)$ or $-9c(5d-2)$ (B1 for $9(2c-5cd)$ or $c(18-45d)$ or $3c(6-15d)$ or $3(6c-15cd)$ **or** $9c(p+qd)$ where p and q are non-zero integers **or** $(2-5d)$ as a factor)
	(b)	eg $5-2x=18x-24$ **or** $\frac{5}{6}-\frac{2}{6}x=3x-4$		3	M1	for removal of the fraction **and** correctly multiplying out RHS by 6 in an equation **or** separating fractions on the LHS in an equation
		$5+24=18x+2x$ oe **or** $29=20x$ oe **or** $\frac{5}{6}+4=\frac{2}{6}x+3x$ oe			M1ft	dep on 4 terms for correctly rearranging their 4 term equation for terms in x on one side of the equation and number terms on the other
		Working required	1.45		A1	dep on M1 oe eg $\frac{29}{20}$ or $1\frac{9}{20}$
						Total 5 marks

Question		Working	Answer	Mark	Notes
19	(a)	$3c - 21 + 6c + 8$	$9c - 13$	2	M1 For 3 or 4 terms correct A1
	(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 A1
	(c)		$7y(4y - 3)$	2	B2 B1 for $y(28y - 21)$ or $7(4y^2 - 3y)$ or $7y(4y + k)$ or $7y(ay - 3)$
					Total 6 marks

20	6h 42 min = 6.7 h or $6\frac{42}{60}$ oe or 402 (mins) or 24120 (secs) **OR** 10.8(33…)(km) eg 6.7 × 650 or (402 × 650) ÷ 60 or (24120 × 650) ÷ 3600 or 6 × 650 + 42 × 10.8	4355	3	B1 for converting 6h 42min into hours or minutes or seconds **OR** finding distance travelled in 1 minute M1 use of s × t, allow 6.42 × 650 (=4173) A1
				Total 3 marks

Question		Working	Answer	Mark	Notes
7	(a)		97	1	B1
	(b)		729	1	B1
	(c)		19	1	B1
	(d)(i)	$\frac{\sqrt{91.21}}{2.46} = \frac{9.55...}{2.46}$			M1 for 9.55(039...) **or** 2.46 **or** 91.21 **or** 3.8 **or** 3.9 **or** 3.88 **or** 3.882
			3.8822 (7344)	2	A1
	(d)(ii)		3.9	1	B1 ft if at least 2dp in (i)
8	(a)				M1 for $6e$ or $-10f$
			$6e - 10f$ oe	2	A1 do **not** award if in incorrect attempt at simplification is seen eg $-4ef$
	(b)	$20x + 15 - 3x + 1$			M1 for 3 correct terms
			$17x + 16$	2	A1 SC : B1 for $5x + 20$
	(c)		$2p(2 + 3q)$	2	B2 If not B2 then award B1 for $2(2p + 3pq)$ **or** $p(4 + 6q)$ **or** $2p$(a two term expression) **or** $x(2 + 3q)$ where $x \neq 2p$

20	(a)	$6x^2 + 9x - 3x^2 - 5x$		2	M1	expansion with at least 3 correct terms (must see for example, $6x^2$ and not just $3x \times 2x$)(can assume that no sign in front of a number is a + if terms written in a list or table)
		Working not required, so correct answer scores full marks (unless from obvious incorrect working)	$3x^2 + 4x$		A1	or $4x + 3x^2$ or $x(3x + 4)$ or $x(4 + 3x)$
	(b)	$p + d = at$ **or** $-at = -d - p$ **or** $\frac{p}{a} = \frac{at}{a} - \frac{d}{a}$ oe		2	M1	Correct first stage in rearrangement
		Working not required, so correct answer scores full marks	$t = \frac{p+d}{a}$		A1	oe eg $t = \frac{p}{a} + \frac{d}{a}$ or $t = \frac{-p-d}{-a}$ Must have "$t =$" either in working or on answer line
	(c)	$w^2 \times w^n = w^{10}$ **or** $w^5 \times w^n = w^{13}$ **or** $w^5 \times w^{n-3} = w^{10}$ **or** $\frac{w^{5+n}}{w^3} = w^{10}$ **oe** **or** $5 + n - 3 = 10$ **or** $2 + n = 10$ **or** $5 + n = 13$		2	M1	A correct first stage simplifying at least one index in a correct equation **or** a correct equation using indices only
		Working not required, so correct answer scores full marks (unless from obvious incorrect working)	8		A1	accept w^8 (trial and error gains full marks if correct and no marks if incorrect unless a rule of indices is clearly shown)
						Total 6 marks

12	$2\times\pi\times8.5$ oe		2	M1
	Correct answer scores full marks (unless from obvious incorrect working)	53.4		A1 allow answers in range 53.3 – 53.43
				Total 2 marks

13	(a)		$3x-x^2$	1	B1
	(b)		$6(2a-3b)$	2	B2 If not B2, then B1 for $3(4a-6b)$ or $2(6a-9b)$ or 6(expression with one error)
	(c)		$T=8h+20j$	3	B3 for $T=8h+20j$ oe eg $T = 4(2h + 5j)$ oe [accept $T = 8 \times h + 20 \times j$] (B2 for $8h + 20j$ or $T = 8h + aj$ or $T = bh + 20j$ or $T = 20h + 8j$ or a correct equation with letters such as S and L eg $T = 8S + 20L$) (B1 for $8h + aj$ or $bh + 20j$ or $20h + 8j$ or for T = an incorrect expression in h and j)
					Total 6 marks

16 (a)		$6p(2q-3)$	2	B2 If not B2 then award B1 for any **correct** partial factorisation with 2 factors taken out ($2p$ or $3p$ or 6 (2×3)) outside of the bracket $2p(6q-9)$ or $3p(4q-6)$ or $6(2pq-3p)$ or allow $6p$ and one error inside the bracket eg $6p(2q-a)$ or $6p(b-3)$ oe eg $6p(2q+3)$			
(b)	$y + (3y + 7) + (2y - 5)$ (= $6y + 2$) oe or $56 - 7 + 5$ (= 54)		4	M1	M2 for $y + (3y + 7) + (2y - 5) = 56$ oe or $6y = 54$ oe	M3 for $(56 - 7 + 5) \div 6$ (= 9) or $54 \div 6$ (= 9)	
	$y + (3y + 7) + (2y - 5) = 56$ or "$6y + 2$" = 56 oe eg $6y = 54$			M1			
	$(y =)\frac{56-2}{6}(=9)$ oe			M1 for a correct method to find the value of y or the correct value of y			
		13		A1 (or for 9 (gold), 34 (silver) and 13 (zinc) seen) dep on sight of ($y =$) 9 SCB2 for 16.6 (17 if rounded 16.6 seen) (if no other marks awarded) SCB1 for $5y + 2 = 56$ oe (if no other marks awarded)			
				Total 6 marks			

20	(a)		p^{15}	1	B1 cao
	(b)	$8n^2+6n+n^2-4n$		2	M1 for expanding with at least 3 correct terms (must see for example, $8n^2$ and not just $2n \times 4n$)(can assume that no sign in front of a number is a + if terms written in a list or table)
			$9n^2+2n$		A1 oe $2n+9n^2$ or $n(9n+2)$ or $n(2+9n)$
	(c)	e.g. $2x+5=12-3x$ or $\frac{2}{3}x+\frac{5}{3}=4-x$ oe		3	M1 for removal of fraction **and** multiplying out RHS correctly by 3 **or** separating fraction (LHS) in an equation
		e.g. $2x+3x=12-5$ or $5x=7$ or $5-12=-3x-2x$ or $-7=-5x$ or $\frac{2}{3}x+x=4-\frac{5}{3}$ oe or $\frac{5}{3}x=\frac{7}{3}$ oe			M1 ft (dep on 4 terms) correctly rearranging their 4 term equation for terms in x on one side of equation and number terms on the other
		Working required	$\frac{7}{5}$		A1 oe eg 1.4 or $1\frac{2}{5}$ dep on M2
					Total 6 marks

Question		Working	Answer	Mark	Notes	
12	(a)	$\frac{13+8+8+6+5}{2}$ or $\frac{(13+8+8+6+5)+1}{2}$ or $\frac{40}{2}$ or $\frac{41}{2}$ or 20 or 20.5	22	2	M1 A1	A clear attempt to list the 40 numbers in order and to find the middle number.
	(b)	(21 × 13) + (22 × 8) + (23 × 8) + (24 × 6) + (25 × 5) (= 273 + 176 + 184 + 144 + 125) (= 902) "902" ÷ 40	22.55	3	M1 M1 dep A1	At least 4 products correctly stated or evaluated Accept 22 or 23 if 22.55 seen
						Total 5 marks

13	(a)	$3f = 11 + 5$ or $3f = 16$	$\frac{16}{3}$ oe	2	M1 A1	A correct rearrangement of numbers on one side accept $5\frac{1}{3}$ or 5.3 with recurring symbol or 5.33 (at least 2 3's) NB. 16/3 in body of script then 5.3 on ans line = M1 A1 5.3 on ans line with no working = M1 A0
	(b)		$w^2 + 3w$	1	B1	
	(c)	$5(-3)^2 + 20$	65	2	M1 A1	Ans of -25 = M1 A0 if substitution seen
	(d)		$(x + 4)(x - 9)$	2	M1 A1	For $(x + a)(x + b)$ where $ab = -36$ and a and b are integers Ignore extension to roots $x = -4$ & 9
						Total 7 marks

Question		Working	Answer	Mark	Notes	
14		150 ÷ 6 (= 25) or 420 ÷ 6 (= 70) or 170 ÷ 6 (= 28.333...) or 95 ÷ 6 (= 15.83...) 755 ÷ "25" (= 30.2) and 1265 ÷ "70" (= 18.07...) and 685 ÷ "28.333..." (= 24.176...) and 950 ÷ "15.83..." (= 60)		4	M1 M2 dep	Ingredients for 1 pie M2 for calculations of all 4 ingredients If not M2 then M1 for 1 correct calculation
		Alt: 755 ÷ 150 (= 5.0333..) or 1265 ÷ 420 (= 3.0119 ..) or 685 ÷ 170 (= 4.029..) or 950 ÷ 95 (= 10) "5" × 6 (= 30) and "3" × 6 (= 18) and "4" × 6 (= 24) and "10" × 6 (= 60)	18 18		A1 M1 M2 dep A1	cao (must be an integer) M2 for calculations of all 4 ingredients. These values do not have to be integers. If not M2 then M1 for 1 correct calculation cao (must be an integer) 18.07 .. as a selected answer = M3 A0 Correct answer is not dependent on M3
						Total 4 marks

12	$\frac{7.5}{100}\times 120$ (= 9) or 1.075 ×120 (=129) or 120 × 12 × 0.075 (108)		3	M1
	(120 + '9') × 12 or "129" × 12 120 × 12 × 0.075 + 120 × 12 oe eg 108 + 1440			M1
		1548		A1
				Total 3 marks

13	(a)		$5x - x^2$	1	B1
	(b)		$3(y - 7)$	1	B1
	(c)	$f + d = 3p$ **or** $\frac{f}{3} = p - \frac{d}{3}$		2	M1 A correct first stage in a correct formula
			$p = \frac{f+d}{3}$		A1 for $p = \frac{f+d}{3}$ (must see p =… at some stage) (SCB1 for $p = \frac{f-d}{3}$)
	(d)		$T = 10m + 6n$	3	B3 for $T = 10m + 6n$ oe
					(B2 for $10m + 6n$ or $T = 10m + an$ or $T = bm + 6n$ or $T = 6m + 10n$)
					(B1 for $10m + an$ or $bm + 6n$ or $6m + 10n$) or for T = an incorrect expression in m and n
					Total 7 marks

16	(a)	$2x^2-3x+14x+7 \quad (-5)$		3	M1	for at least 3 correct terms for the multiplying of the 2 brackets
					M1	2 of the 3 correct terms in an expression in the form ax^2+bx+c where a, b and c are integers
			$2x^2+11x+2$		A1	can be any order
	(b)	$2y-4y+8-y^2$		2	M1	for 3 correct terms **or** for 4 correct terms ignoring signs **or** $...-2y-y^2$ **or** $8-2y-...$
			$8-2y-y^2$		A1	Any order but simplified.
	(c)		$5b^3c(3b^2-7c^8)$	2	B2	fully correct **or** B1 for a correct partial factorisation with at least two terms outside the bracket eg $5b^3(3b^2c-7c^9)$ 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 7 marks

Question		Working	Answer	Mark	Notes
13	(a)	$e^2+3e-5e-15$			M1 for 3 correct terms **or** for 4 correct terms ignoring signs **or** e^2-2e+k for non-zero k **or** $\ldots-2e-15$
			$e^2-2e-15$	2	A1
	(b)	$5y=2y+1$ **or** $y=\frac{2y}{5}+\frac{1}{5}$			M1 for a correct first step
		E.g. $5y-2y=1$ **or** $3y=1$ **or** $3y-1=0$ **or** $\frac{3y}{5}=\frac{1}{5}$			M1 for collecting terms in y in a correct equation
			$\frac{1}{3}$ oe	3	A1 dep on at least M1 for $\frac{1}{3}$ oe **e**.g. $0.\dot{3}$, 0.3333…
	(c)	$(x+6)(x-3)(=0)$ **or** $x(x+6)-3(x+6)(=0)$ **or** $x(x-3)+6(x-3)(=0)$ **or** $(x+6)(x-3)(=0)$ **or** for $x+6=0$ oe **and** $x-3=0$ oe			M1 for $(x\pm6)(x\pm3)(=0)$ **or** for $(x+a)(x+b)$ with $ab=-18$ **or** $a+b=3$
					A1 for correct factors
			$x=-6, x=3$	3	B1 ft dep on at least M1

16	(a)	$2 \times 7 + 3 \times -4$ **or** $14 + -12$ **or** $14 - 12$		2	M1	
			2		A1	
	(b)		e^4	1	B1	
	(c)		y^{16}	1	B1	
	(d)	$x^2 + 9x - 2x - 18$		2	M1	for 3 correct terms or 4 correct terms ignoring signs or $x^2 + 7x +$ c or .... + $7x - 18$
			$x^2 + 7x - 18$		A1	
	(e)		$4cp^2(4c^3 + 5p)$	2	B2	if not B2 then award B1 for any correct factorisation with at least 2 factors outside the bracket eg $4cp(4c^3p + 5p^2)$, $cp^2(16pc^3 + 20p)$, $2p(8c^4 + 10cp^2)$ etc **or** the correct common factor **and** a 2 term expression with just one error
						Total 8 marks

16	a	e.g. $d - g = 2ac$ $\frac{d}{2c} = \frac{g}{2c} + a$			M1	for a correct first step e.g. subtract g from both sides **OR** divide all terms by 2 **OR** divide all terms by c **OR** divide all terms by $2c$
			$a = \frac{d-g}{2c}$	2	A1	oe
	b		$3f(3e - 4)$	2	B2	(B1 for $3(3ef - 4f)$ or $f(9e - 12)$ or $3f(ke - 4)$ or $3f(3e - m)$ where $k \neq 0$ and $m \neq 0$)
	c	$x^2 - 5x + 2x - 10$			M1	for any 3 correct terms **or** for 4 out of 4 correct terms ignoring signs **or** $x^2 - 3x\ldots$ **or** for $\ldots -3x - 10$
			$x^2 - 3x - 10$	2	A1	
	d	$\frac{n^{11}}{n^5}$ **OR** $n^{-1} \times n^7$ **OR** $n^4 \times n^2$ **OR** $n^4 \times n^7 \times n^{-5}$ **OR** $n^{"11"} \div n^5 = n^{("11"-5)}$			M1	for simplifying two terms
			n^6	2	A1	
						Total 8 marks

17	ai		b, l, u, e, g, r, y	1	B1	No incorrect or repeats
	aii		w, h, i, t	1	B1	No incorrect or repeats
	b		No with reason	1	B1	eg 'e is in all three sets' **OR** 'all three sets share a member' **OR** $B \cap G \cap W = (\{\})e(\{\})$
						Total 3 marks

20	(a)	$20 - 5x$ (= $7 - 3x$)		3	M1	for expansion of bracket
		E.g. $20 - 7 = -3x + 5x$ or $-5x + 3x = 7 - 20$			M1	ft from a 4-term equation for a correct process of isolating terms in x on one side of the equation and numbers on the other side
			6.5 oe		A1	dep on M2 awarded
	(b)			2	M1	for any **correct** partial factorisation with at least 2 factors, one of which must be a letter **or** the correct common factor with no more than 1 error inside the bracket
			$8m^2g^3(2m + 3g^2)$		A1	
	(c)(i)	$(y \pm 6)(y \pm 8)$		2	M1	
			$(y - 8)(y + 6)$		A1	
	(c)(ii)		8, −6	1	B1	**must** ft from their factors in (c)(i)
						Total 8 marks

11	(a)	$5 \times (-2)^2 - (-2)^3$ (= 20 – –8)		2	M1	for correct expression or at least one of 20 or 5×4 or – – 8 or (+) 8
			28		A1	
	(b)		$2p(4p - 1)$	2	B2	B1 for $p(8p - 2)$ or $2(4p^2 - p)$ or $2p(4p - 1)$ with two terms inside the bracket with one term correct.
	(c)		$12t^2 - 8t$	2	B2	B1 for $12t^2$ or $-8t$
	(d)	$5x^2 + 20x - 2x - 8$		2	M1	for 4 correct terms (ignoring signs) or 3 correct terms with correct signs. or $5x^2 + 18x + ...$ or … + 18x − 8
			$5x^2 + 18x - 8$		A1	
						Total 8 marks

12	$0.5 \times \pi \times 6^2$ (= 56.54…) **or** 12 × 6 (= 72) **or** $\pi \times 6^2$ oe		3	M1	
	"72" – "56.54…"			M1	dep M1 for a complete method
		15.5		A1	15.4 to 15.5
					Total 3 marks

13	$2x - 3 = 20 \div 5$ or $10x - 15 = 20$		3	M1	
	$2x$ = "4" + 3 oe or $10x$ = 20 + "15" $10x$ = 35 oe			M1	For collecting terms, ft their expansion
		3.5 oe		A1	dep M1 accept $\frac{7}{2}$ or $\frac{35}{10}$
					Total 3 marks

23	(a)	eg $10p = 3p - 5$ **or** $p = \frac{3p}{10} - \frac{5}{10}$ oe eg $p = 0.3p - 0.5$		3	M1	for a correct first step – multiplying both sides by 10 correctly or writing the RHS as 2 terms each over 10 or each term as a decimal [must be in a correct equation]
		eg $10p - 3p = -5$ **or** $7p = -5$ **or** $p - \frac{3p}{10} = -\frac{5}{10}$ **or** $0.7p = -0.5$			M1ft	(ft a 3 term equation) for collecting terms in p on one side and number the other
			$-\frac{5}{7}$		A1	(dep on at least M1) for $-\frac{5}{7}$ oe, accept −0.71(4...) allow –0.7 if you have seen $-\frac{5}{7}$ or $-5 \div 7$
	(b)		1	1	B1	
	(c)		$\frac{y^2}{2x}$	2	B2	for $\frac{y^2}{2x}$ oe eg $\frac{0.5y^2}{x}$, $0.5y^2x^{-1}$, $\frac{y^2x^{-1}}{2}$, $\frac{1}{2xy^{-2}}$ oe If not B2, award B1 for 2 of number, x, y correct eg $\frac{ky^2}{x}$ where $k \neq \frac{1}{2}$ **or** $\frac{y^2}{2x^m}$ where $m \neq 1$ **or** $0.5y^2$ **or** $\frac{y^p}{2x}$ where $p \neq 2$) **oe** [one term can be missing with 2 correct for B1]

(d)		$5cd^2(2c^2+3d^2)$	2	B2	for $5cd^2(2c^2+3d^2)$ B1 for a correct partial factorisation eg $5(2c^3d^2+3cd^4)$ or $cd^2(10c^2+15d^2)$ **or** $5d^2(2c^3+3cd^2)$ **or** $5c(2c^2d^2+3d^4)$ **or** $5cd(2c^2d + 3d^3)$ etc **or** $5cd^2$(a 2 term expression with just one error)
					Total 8 marks

24	$(4^n =)(2^2)^n$ **or** $(4^n =)2^{2n}$ oe eg $2^k \div 2^{2n} = 2^x$ **or** $2^k = 4^{\frac{1}{2}k}$ **and** $2^x = 4^{\frac{1}{2}x}$ oe eg $\frac{4^{\frac{1}{2}k}}{4^n} = 4^{\frac{1}{2}x}$		2	M1	for writing 4^n as $\left(2^2\right)^n$ or 2^{2n} or for writing each term in terms of 4 ie $2^k = 4^{\frac{1}{2}k}$ **and** $2^x = 4^{\frac{1}{2}x}$ If these things are seen in working, award this mark even if followed by incorrect working – if not a choice of methods
		$k-2n$		A1	allow 2^{k-2n}
					Total 2 marks

21	(a)		$8c^{12}d^{21}$	2	B2	(B1 for 2 correct terms as part of a product)
	(b)		5	1	B1	
	(c)		$4a^2b(4b^2 + 5a)$	2	B2	B1 for any correct partial factorisation with at least 2 factors, **or** the correct common factor with no more than 1 error inside the bracket
	(d)(i)	$(x \pm 11)(x \pm 2)$		2	M1	for $(x \pm 11)(x \pm 2)$ **or** for $(x + a)(x + b)$ with $ab = -22$ or $a + b = 9$
		Correct answer scores full marks (unless from obvious incorrect working)	$(x + 11)(x - 2)$		A1	for correct factors
	(ii)		$-11, 2$	1	B1ft	ft dep on factorising in the form $(x + p)(x + q)$
						Total 8 marks

22		$x \leq 1$	4	B1	accept $x < 1$
		$y \geq -2$		B1	accept $y > -2$
	$y = 2x + c$ or $y = mx + 4$			M1	allow = or < or ≤ or > or ≥
	Correct answer scores full marks (unless from obvious incorrect working)	$y \leq 2x + 4$		A1	oe, allow $y < 2x + 4$ oe SCB2 for the correct inequalities with all inequality signs the wrong way round
					Total 4 marks

22 (a)	eg $2f = 12f - 51$ **or** $\frac{f}{3} = \frac{4}{2}f - \frac{17}{2}$ **or** $\frac{f}{3} = 2f - \frac{17}{2}$ **or** $0.3f = 2f - 8.5$ **or** $f = 6f - \frac{51}{2}$ **or** $f = 6f - 25.5$ **or** $17 = 4f - \frac{2}{3}f$ **or** $17 = 4f - 0.6f$ **or** $17 = 4f - 0.7f$ **or** $\frac{2}{3}f - 4f = -17$ **or** $0.6f - 4f = -17$ **or** $0.7f - 4f = -17$		3	M1	for a correct first step – multiplying both sides by 3 correctly and expanding to find $2f = 12f - 51$ or $2f = -51 + 12f$ or writing the RHS as 2 terms each over 2 (Allow decimals to 1dp or better – rounded or truncated)
	eg $-10f = -51$ **or** $10f = 51$ **or** $\frac{5f}{3} = \frac{17}{2}$ **or** $5f = \frac{51}{2}$ or $17 = \frac{10f}{3}$ **or** $3.3f = 17$ **or** $-\frac{10f}{3} = -17$ **or** $-3.3f = -17$			M1	for a correct 2 term equation in the form $af = b$ ft the following equations only $2f = 12f - 17$ oe $2f = 4f - 51$ oe $6f = 12f - 51$ oe (Allow decimals to 1dp or better – rounded or truncated)
	Working required	$\frac{51}{10}$		A1	(dep on at least M1) oe

22	(b)		1	1	B1	
	(c)		$3a^3h^4$	2	B2	for $3a^3h^4$ oe B1 for a product in the form ka^ph^q where 2 from k, p or q are correct (allow multiplication signs) eg $5a^3h^4$ or $\frac{12a^3h^4}{4}$ (Allow $3a^3$ or a^3h^4 or $3h^4$ as long as not added to any other term)
	(d)		$4x^3y(5x^2+3y^3)$	2	B2	for $4x^3y(5x^2+3y^3)$ B1 for any correct factorisation with at least a 2 term factor outside the bracket eg $2x^3y(10x^2+6y^3)$ **or** $x^3y(20x^2+12y^3)$ **or** $2x(10x^4y+6x^2y^4)$ **or** $4y(5x^5+3x^3y^3)$ **or** $4x^3(5x^2y+3y^4)$ etc **or** the correct highest common factor **and** a 2 term expression with at most one incorrect term eg $4x^3y(5x^2+\ldots)$ or $4x^3y(\ldots+3y^3)$
						Total 8 marks

Question		Working	Answer	Mark	Notes	
16	a		y^{14}	1	B1	
	b		$16m^{12}$	2	B2	if not B2 then B1 for am^{12} **or** $16m^{b}$ **or** $2^{4}m^{12}$ $b \neq 0, 12$ $a \neq 1, 16$
	c	$5x + 15 = 3x - 4$ **or** $x + 3 = \frac{3x}{5} - \frac{4}{5}$ e.g. $5x - 3x = -4 - 15$	$-\frac{19}{2}$ oe	3 2	M1 M1	for removing bracket in a correct equation or dividing all terms by 5 in a correct equation ft from $ax + b = cx + d$ for correctly isolating terms in x on one side of equation and constant terms on the other side
					A1	dep on at least M1
	d (i)		 $(x - 4)(x + 6)$		M1 A1	for $(x + a)(x + b)$ where either $ab = -24$ **or** $a + b = +2$ e.g $(x - 6)(x + 4)$
	(ii)		4, −6	1	B1	cao **or** ft from any $(x + p)(x + q)$
17	ai		1, 2, 3, 4, 6, 12	1	B1	cao
	aii		1, 3, 5, 7, 9, 10, 11	1	B1	cao
	b		Yes with reason	1	B1	e.g. no numbers in both A and C **or** A and C do not intersect **or** A and C do not overlap **or** A and C are mutually exclusive
	c		$\frac{10}{12}$ oe	2	M1 A1	for $12 - 2$ (=10) **or** $\frac{a}{12}$ with $a < 12$ **or** 10 and 12 used with incorrect notation E.g. 10 : 12 for $\frac{10}{12}$ oe **or** 0.83(3…) **or** 83(.3..)%

21	(a)	$m^2 - 8m + 5m - 40$		2	M1 for any 3 correct terms **or** for 4 out of 4 correct terms ignoring signs **or** for $m^2 - 3m \ldots$ **or** for $\ldots - 3m - 40$
			$m^2 - 3m - 40$		A1
	(b)		$5y(1 + 4y)$	2	B2 If not B2 then award B1 for $5(y + 4y^2)$ **or** $y(5 + 20y)$ **or** $5y(a + 4y)$ where a is an integer and $a \neq 0$ **or** $5y(1 + by)$ where b is an integer and $b \neq 0$
	(c)		1	1	B1
	(d)	E.g. $6x - 15$ or $12x - 30$ oe		4	M1 for expansion of a correct bracket
		$2 \times 3(2x - 5) = 9 - x$ oe **or** $2(\text{'}6x - 15\text{'}) = 9 - x$ oe **or** $3(2x - 5) = \frac{9}{2} - \frac{x}{2}$ oe			M1 for removal of fraction **or** separating fraction (RHS) in an equation
		$12x + x = 9 + 30$ oe **or** $6x + \frac{x}{2} = \frac{9}{2} + 15$ oe			M1 ft (dep on 4 terms) for terms in x on one side of equation; number terms on the other
			3		A1 dep on at least M2 awarded
					Total 9 marks

22	(a)		g^7	1	B1	
	(b)		$5k^5+20k^2$	2	B2	for $5k^5+20k^2$
					(B1	for $5k^5$ or $20k^2$)
	(c) (i)	$(x \pm 7)(x \pm 9)$		2	M1	for $(x \pm 7)(x \pm 9)$ **or** for $(x + a)(x + b)$ where $ab = -63$ **or** $a + b = -2$ where a and b are integers
		Correct answer scores full marks (unless from obvious incorrect working)	$(x + 7)(x – 9)$		A1	for correct factors
	(ii)		–7, 9	1	B1	must ft from (c)(i) dep on factorising in the form $(x+p)(x+q)$ where p and q are integers
	(d)	$-2y-3y<-12-7$ **or** $7+12<3y+2y$ **or** $7 < 5y – 12$ **or** $7 – 5y < -12$ **or** $-2y < 3y – 19$ **or** $19 – 2y < 3y$		3	M1	for rearrangement with y terms on one side and numerical terms on the other in a correct inequality **or** the correct simplification of y terms or numbers on one side in a correct inequality sign can be = or the incorrect inequality sign
		$-5y<-19$ **or** $19<5y$ **or** $-y<\frac{-19}{5}$ **or** $y<\frac{19}{5}$ **or** $y=\frac{19}{5}$ oe			M1	for the correct simplification of y terms on one side and numbers on the other side in a correct inequality **or** a correct inequality with the wrong sign sign can be = or the incorrect inequality sign
		Correct answer scores full marks (unless from obvious incorrect working)	$y>\frac{19}{5}$		A1	oe eg $y > 3.8$ or $3.8 < y$ Must be given as the correct inequality on the answer line
						Total 9 marks

10	[5.8, 6.2] × 1.5 (= [8.7, 9.3])	[5.8, 6.2] × 18 (= [104.4, 111.6])		3	M1	M2 for [5.8, 6.2] × 27
	"[8.7, 9.3]" × 18 (= [156.6, 167.4]) or their value × 18	"[104.4, 111.6]"× 1.5 (= [156.6, 167.4]) or their value × 1.5			M1 Do not allow 18 × 1.5 oe on its own	
	Correct answer scores full marks (unless from obvious incorrect working)		162		A1 allow [156.6, 167.4] Ignore attempts at conversions from minutes to hours/minutes or seconds	
						Total 3 marks

11	$c-5=8d$ oe or $-8d=-c+5$ or $\frac{c}{8}=d+\frac{5}{8}$ oe or $\frac{c-5}{8}$ oe			M1
	Correct answer scores full marks (unless from obvious incorrect working)	$d=\frac{c-5}{8}$		A1 accept $d=\frac{c}{8}-\frac{5}{8}$ oe or $d=\frac{5-c}{-8}$ oe (must see d = … on answer line or in working)
				Total 2 marks

13	(a)	$18 - -3 \times 5$ or $18 - -15$ or $18 + 15$		2	M1
		Correct answer scores full marks (unless from obvious incorrect working)	33		A1
	(b)	$d - 10 = 3x$ oe or $-3x = -d + 10$ or $\frac{d}{3} = x + \frac{10}{3}$ oe or $\frac{d-10}{3}$ oe		2	M1
		Correct answer scores full marks (unless from obvious incorrect working)	$x = \frac{d-10}{3}$		A1 accept $x = \frac{d}{3} - \frac{10}{3}$ oe or $x = \frac{-d+10}{-3}$ oe (must see $x =$ … on answer line or in working)
					Total 4 marks

14	a		$5(5f-2)$	1	B1	
	b	$c+h=5y$ or $\frac{c}{5}=y-\frac{h}{5}$ or $\frac{c+h}{5}$		2	M1	
			$y=\frac{c+h}{5}$		A1	oe if the student puts $\frac{c+h}{5}$ on the answer line then if we have previously see $y=\frac{c+h}{5}$ we can award full marks
	c	$4x>2-7$ oe or $x+\frac{7}{4}>\frac{2}{4}$ oe		2	M1	accept as an equation or with wrong inequality sign.
			$x>-1.25$		A1	oe allow $(-1.25, (+)\infty)$ Note: award M1A0 for an answer of -1.25 with no sign or the incorrect sign eg $x=-1.25$, $x<-1.25$
						Total 5 marks

12	(a)		$4x - x^2$	1	B1	
	(b)	e.g. $1.5 \times 2.4 - (-5.6)$ **or** $1.5 \times 2.4 + 5.6$ **or** $3.6 + 5.6$ oe		2	M1	for a correct substitution
			9.2		A1	accept $\frac{46}{5}$ or $9\frac{1}{5}$
	(c)	$y + e = dx$ oe **or** $\frac{y}{x} = d - \frac{e}{x}$		2	M1	for a correct first step
			$d = \frac{y+e}{x}$		A1	oe e.g. $d = \frac{y}{x} + \frac{e}{x}$
						Total 5 marks

13	(a)	e.g. $\frac{180}{750} \times 100$ oe **or** 0.24×100		2	M1	for a complete method
			24		A1	
	(b)	e.g. 32.50×180 (= 5850) **or** e.g. 0.94×32.50 oe (= 30.55)		3	M1	for finding the total income **or** 94% of the cost of one ticket
		e.g. $0.94 \times$ "5850" oe **or** "5850" – $0.06 \times$ "5850" oe **or** $180 \times$ "30.55"			M1	for a complete method
			5499		A1	
						Total 5 marks

19	3.4 or $\frac{17}{5}$ or $3\frac{2}{5}$ or $3\frac{24}{60}$ or 204 oe		3	B1	
	433.5 ÷ 3.4 or 433.5 ÷ $\frac{17}{5}$ or 433.5 ÷ $3\frac{2}{5}$ or $\frac{433.5}{'204'} \times 60$ oe			M1	for use of speed = distance ÷ time Allow 433.5 ÷ 3.24 (= 133.796…) for this mark only
		127.5		A1	oe allow 128
					Total 3 marks

20	a	(x =) 270 ÷ (12 × 5) (= 4.5) oe		3	M1	
		π × '4.5'^{2} × 2 × '4.5' (= 182.25π oe)			M1	ft dep on M1
			573		A1	accept 572 − 573
	b		1 000 000	1	B1	or (1 ×) 10^6 or (one or 1) million oe
						Total 4 marks

21	a	e.g. $A + 5z = \frac{c}{y}$ oe **or** $Ay = c - 5yz$ oe		2	M1	for a correct first step e.g. add 5z to both sides **or** multiply all terms by y
			$c = y(A + 5z)$		A1	oe
	b		1	1	B1	
	c	$(x \pm 3)(x \pm 8)$		2	M1	or for $(x \pm a)(x \pm b)$ where $ab = 24$ or $a + b = -11$
			$(x - 3)(x - 8)$		A1	
						Total 5 marks

Question		Working	Answer	Mark	Notes
12	(a)	$w+d=3y$ oe or $-3y=-w-d$ oe or $\frac{w}{3}=y-\frac{d}{3}$ oe or $\frac{w+d}{3}$ oe or $y=w+d\div 3$		2	M1 for a correct first step
		Working not required, so correct answer scores full marks (unless from obvious incorrect working)	$y=\frac{w+d}{3}$		A1 oe eg $y=\frac{-d-w}{-3}$ or $y=\frac{w}{3}+\frac{d}{3}$ oe or $y=(w+d)\div 3$ (must see $y=\ldots$ on answer line or in working)
	(b)		$T = 12b + 3p$	3	B3 for $T = 12b + 3p$ oe [accept $T = 12 \times b + 3 \times p$] B2 for $12b + 3p$ or $T = 12b + xp$ or $T = yb + 3p$ or a correct equation with other letters eg $T = 12m + 3n$ B1 for $12b + xp$ or $12b$ or $yb + 3p$ or $3p$ or $12p + 3b$ or $T = kb + cp$ where $k \neq 0$ or $k \neq 12$ and $c \neq 0$ or $c \neq 3$ Accept upper or lower case for T, b and p including a mixture of these for B3, B2 and B1
					Total 5 marks

Question	Working	Answer	Mark	Notes
18 (a)	$ac=M+bd$ **or** $-ac = -M - bd$ **or** $\frac{M}{c}=a-\frac{bd}{c}$		2	M1 For a correct first stage
		$a=\frac{M+bd}{c}$		A1 oe, eg $a=\frac{M}{c}+\frac{bd}{c}$, $a=\frac{-M-bd}{-c}$ [must have been seen with a = to award accuracy mark]
(b)	$5x<39+4$ oe		2	M1 Accept as equation or with the wrong inequality sign. Also award M1 for an answer of 8.6 or 8.6 with an = sign or the incorrect inequality sign.
		$x<8\frac{3}{5}$		A1 Accept $x<\frac{43}{5}$ **or** $x<8.6$ **or** $[-\infty, 8.6)$
(c)	eg $6e^2(3f^3-2ef)$, eg $2f(9e^2f^2-6e^3)$ eg $ef(18ef^2-12e^2)$		2	M1 Any correct partially factorised expression with at least 2 terms in the common factor **or** for the correct common factor and a 2 term expression inside the brackets with just one error
		$6e^2f(3f^2-2e)$		A1
				Total 6 marks

Question		Working	Answer	Mark	Notes
21	(a)		g^{10}	1	B1
	(b)		k^{15}	1	B1
	(c)		$5y^4$	2	B2 B1 for fully simplifying terms in x or terms in y
	(d)	$h - f = 3e$ or $\frac{h}{3} = e + \frac{f}{3}$ or $\frac{h-f}{3}$		2	M1
			$e = \frac{h-f}{3}$		A1 oe, accept $e = \frac{f-h}{-3}$
					Total 6 marks

Question		Working	Answer	Mark	Notes
12	(a)		x^2+3x	1	B1
	(b)		$2(4p+5)$	1	B1
	(c)	eg $y+f=eh$ or $\frac{y}{h}=\frac{eh}{h}-\frac{f}{h}$		2	M1 an equation that is one step from the answer
			$e=\frac{y+f}{h}$		A1 oe eg $e=\frac{y}{h}+\frac{f}{h}$ oe must see $e=$ …. in working if not on answer line SCB1 for $\frac{y+f}{h}$ or $e=\frac{y-f}{h}$ or $e=y+f\div h$
	(d)		8, 9, 10	2	B2 (B1 for two correct values with none incorrect or three correct values and one incorrect value or two correct values and one incorrect value)
					Total 6 marks

14	(a)		$10x - x^2$	1	B1	oe eg $-x^2 + 10x$
	(b)		$3(2y + 9)$	1	B1	
	(c)	eg $h - 4 = \frac{m}{2}$ **or** $2h = m + 8$		2	M1	for a correct first step
		Correct answer scores full marks (unless from obvious incorrect working)	$m = 2(h - 4)$		A1	oe eg $m = 2h - 8$ SC award M1 for $m = 2h - 4$ **or** $m = h - 8$
	(d)	eg $7g - 2g + 3 = -5$ **or** $5g + 3 = -5$ **or** $7g = 2g - 5 - 3$ **or** $7g = 2g - 8$		3	M1	for correctly collecting the terms in g on one side or the numbers on one side
		eg $7g - 2g = -5 - 3$ **or** $5g = -8$			M1	for a correct rearrangement with terms in g on one side and numbers on the other. Award of this mark implies the first M1
		Working required	$-\frac{8}{5}$		A1	(dep on M1) oe eg $-1\frac{3}{5}$ or −1.6
						Total 7 marks

Question		Working	Answer	Mark	Notes
11	(a)	$5m = 24 - 7$ **or** $m + \frac{7}{5} = \frac{24}{5}$			M1
			3.4 oe	2	A1 for 3.4 oe e.g. $\frac{17}{5}$
	(b)	$2k = t - e$			M1
			$t = 2k + e$	2	A1 NB: $2k + e$ only on answer line scores M1 unless $t = 2k + e$ in working and then M1A1
	(c)		p^5	1	B1
	(d)		1	1	B1
	(e)		$27x^6y^{15}$	2	B2 If not B2 then B1 for any two correct terms in a product
12	(a)	$2 \times \pi \times 9$ **or** $\pi \times 18$			M1
			56.5	2	A1 for answer in range 56.5 – 56.6
	(b)	$\sqrt{169}$ (=13)			M1
		5 × "13" oe			M1
			65	3	A1

3	(a)		**A** and **D**	1	B1	
	(b)		Correctly enlarged shape	2	B2	A correctly drawn shape (B1 for a shape with 3 sides correctly enlarged)
	(c)		hexagon	1	B1	Condone incorrect spelling if meaning is unambiguous
						Total 4 marks

4	(a)		evens	1	B1	
	(b)		Cross at 0	1	B1	
	(c)		Cross at the 2nd mark along	1	B1	ie the mark before ½
	(d)		Cross at the 4th mark along	1	B1	ie the mark after ½
						Total 4 marks

5	(a)		$3w$	1	B1	
	(b)		$8a$	1	B1	
	(c)		f^5	1	B1	
	(d)		$9c - 2h$	2	B2	(B1 for one correct term)
	(e)		$5(2d + 3)$	1	B1	
	(f)	$e - g = 7t$ or $\frac{e}{7} = t + \frac{g}{7}$ oe		2	M1	
			$t = \frac{e-g}{7}$		A1	oe e.g. $(e - g) \div 7$
						Total 8 marks

6	30 ÷ 3.05 (= 9.8...)		3	M1	oe, e.g. adding 9 lots of 3.05
	30 – 9 × 3.05 oe			M1	
		2.55		A1	oe
					Total 3 marks

23	(a)		$x^2 - 3x$	1	B1	
	(b)	eg $5m = t + 4$ **or** $m = \frac{t}{5} + \frac{4}{5}$		2	M1	for a correct first step
		Correct answer scores full marks (unless from obvious incorrect working)	$t = 5m - 4$		A1	oe eg $t = 5\left(m - \frac{4}{5}\right)$ **or** $t = -4 + 5m$ $5m - 4$ only on answer line scores M1 unless $t = 5m - 4$ is seen in the working then score M1A1
	(c)		a^{16}	1	B1	
	(d)		c^{18}	1	B1	
	(e)(i)			2	M1	for $(y \pm 3)(y \pm 7)$ **or** for $(y \pm a)(y \pm b)$ with $ab = 21$ or $a + b = -10$
		Correct answer scores full marks (unless from obvious incorrect working)	$(y - 3)(y - 7)$		A1	for correct factors
	(ii)		3, 7	1	B1	ft dep on factorising in the form $(y \pm p)(y \pm q)$
						Total 8 marks