TOPICAL PAST PAPER WORKSHEETS

IGCSE Mathematics (0580) Paper 4
[Extended]

Exam Series: February/March 2017 - May/June 2024

Format Type A:
Answers to all questions are provided as an appendix

Introduction

Each Topical Past Paper Questions Compilation contains a comprehensive collection of hundreds of questions and corresponding answer schemes, presented in worksheet format. The questions are carefully arranged according to their respective chapters and topics, which align with the latest IGCSE or AS/A Level subject content. Here are the key features of these resources:

1. The workbook covers a wide range of topics, which are organized according to the latest syllabus content for Cambridge IGCSE or AS/A Level exams.

2. Each topic includes numerous questions, allowing students to practice and reinforce their understanding of key concepts and skills.

3. The questions are accompanied by detailed answer schemes, which provide clear explanations and guidance for students to improve their performance.

4. The workbook's format is user-friendly, with worksheets that are easy to read and navigate.

5. This workbook is an ideal resource for students who want to familiarize themselves with the types of questions that may appear in their exams and to develop their problem-solving and analytical skills.

Overall, Topical Past Paper Questions Workbooks are a valuable tool for students preparing for IGCSE or AS/A level exams, providing them with the opportunity to practice and refine their knowledge and skills in a structured and comprehensive manner. To provide a clearer description of this book's specifications, here are some key details:

- Title: Cambridge IGCSE Mathematics (0580) Paper 4 Topical Past Papers

- Subtitle: Exam Practice Worksheets With Answer Scheme

- Examination board: Cambridge Assessment International Education (CAIE)

- Subject code: 0580

- Years covered: February/March 2017 - May/June 2024

- Paper: 4 [Extended]

- Number of pages: 1304

- Number of questions: 541

Contents

Chapter 1

Numbers

1. 0580_m24_qp_42 Q: 1

A grocer sells potatoes, mushrooms and carrots.

(a) A customer buys 3 kg of mushrooms at $1.04 per kg and 4 kg of carrots at $1.28 per kg.

Calculate the total cost.

$ .... [2]

(b) In one week, the ratio of the masses of vegetables sold by the grocer is

potatoes : mushrooms : carrots = 11 : 8 : 6.

(i) Work out the mass of mushrooms sold as a percentage of the total mass.

.... % [2]

(ii) The total mass of potatoes, mushrooms and carrots sold is 1500 kg.

Find the mass of carrots the grocer sells this week.

.... kg [2]

(iii) The profit the grocer makes selling 1 kg of carrots is $0.75 .

Find the total profit the grocer makes selling carrots this week.

$ .... [1]

(iv) On the last day of the week, the grocer reduces the price of 1 kg of potatoes by 8% to $1.15 .

Calculate the original price of 1 kg of potatoes.

$ .... [2]

(c) The grocer buys 620 kg of onions, correct to the nearest 20 kg.
He packs them into bags each containing 5 kg of onions, correct to the nearest 1 kg.

Calculate the upper bound for the number of bags of onions that he packs.

.... [3]

2. 0580_m24_qp_42 Q: 9

(a)   Janna and Kamal each invest $8000.
          At the end of 12 years, they each have $12 800.

   (i)   Janna invests in an account that pays simple interest at a rate of r% per year.

             Calculate the value of r.

                                                    $r = $ .... [3]

   (ii) Kamal invests in an account that pays compound interest at a rate of R% per year.

             Calculate the value of R.

                                                    $R = $ .... [3]

(b)   The population of a city is growing exponentially at a rate of 1.8% per year.
          The population now is 260 000.

          Find the number of complete years from now when the population will first be more than 300 000.

                                                    .... years [3]

3. 0580_s24_qp_41 Q: 1

(a) The table shows the areas, in km^2, of the four largest rainforests in the world.

Rainforest	Area (km^2)
Amazon	5 500 000
Congo	2 000 000
Atlantic	1 315 000
Valdivian	250 000

   (i) Find the area of the Valdivian rainforest as a percentage of the area of the Amazon rainforest.

.... % [1]

   (ii) Write, in its simplest form, the ratio of the areas of the rainforests Valdivian : Atlantic : Congo.

.... : .... : .... [2]

  (iii) The Amazon rainforest has 60% of its area in Brazil and 10% of its area in Colombia.
$43\frac{1}{3}$% of the **remaining area** of the rainforest is in Peru.

Find the percentage of the Amazon rainforest that is in Brazil, Colombia and Peru.

.... % [3]

(iv) The area of the Amazon rainforest represents $\frac{27}{50}$ of the total area of rainforest in the world.

Calculate the total area of rainforest in the world.
Give your answer correct to the nearest $100\,000\,\text{km}^2$.

.... km^2 [3]

(v) In the world, 60.7 hectares of rainforest are lost every minute.

Calculate the total area, in hectares, of rainforest that is lost in 365 days.
Give your answer in standard form.

.... hectares [3]

(b) The Amazon river has a length of $6440\,\text{km}$, correct to the nearest $10\,\text{km}$.
The Congo river has a length of $4400\,\text{km}$, correct to the nearest $100\,\text{km}$.

Calculate the upper bound of the difference between the lengths of the Amazon river and the Congo river.

.... km [3]

4. 0580_s24_qp_42 Q: 1

(a) A fruit drink is made using 1.5 litres of apple juice and 450 millilitres of mango juice.

Write the ratio   apple juice : mango juice   in its simplest form.

.... : .... [2]

(b) One litre of fruit drink is shared between three cups.
The amount in the cups is in the ratio   9 : 6 : 10.

Calculate the number of millilitres in each cup.

.... ml , ... ml , ... ml [3]

(c) A shop buys bottles of the fruit drink for $3.20 each.
It sells them at a profit of 15%.
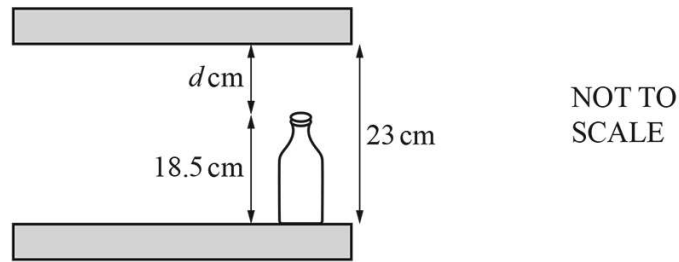
Calculate the selling price of each bottle of fruit drink.

$ .... [2]

(d) The number of bottles of fruit drink sold has grown exponentially at a constant rate of 2.5% per year.
5 years ago, the shop sold 16 620 bottles.

Calculate the number of bottles sold this year.

.... [2]

(e)

The bottles of juice are 18.5 cm tall, correct to the nearest millimetre.
They are stored on shelves.
The distance between the shelves is 23 cm, correct to the nearest centimetre.

Calculate the lower bound for the distance, d cm, between the top of a bottle and the shelf above it.

.... cm [3]

5. 0580_s24_qp_42 Q: 8

A baker decorates x small cakes and y large cakes.
In one day, he decorates:

- not more than 16 small cakes
- less than 10 large cakes
- more small cakes than large cakes
- a total of not more than 24 cakes.

One of the inequalities that shows this information is $x \leqslant 16$.

(a) Write down the other three inequalities in x and/or y.

.... [3]

(b) On the grid, draw four straight lines and shade the unwanted regions to show these inequalities.
Label the region, R, which satisfies the four inequalities.
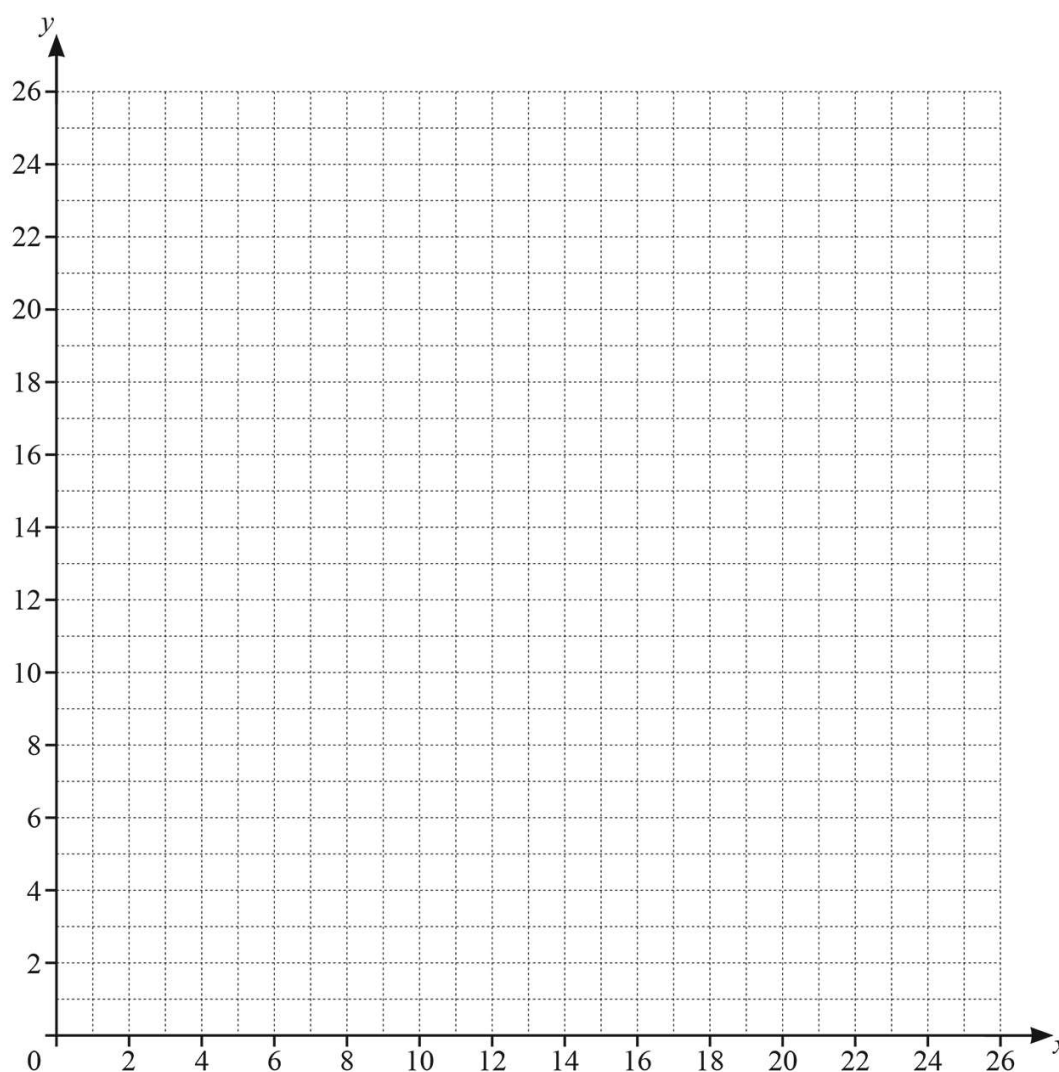
[6]

(c) The baker earns $8 for decorating a small cake and $12 for decorating a large cake.

Use your diagram to find the largest amount the baker can earn in one day by decorating cakes.

$ .... [2]

6. 0580_s24_qp_43 Q: 1

(a) In 2023 a football club had 50 adult members and 70 child members.
The membership fee for an adult was $40 and the membership fee for a child was $15.

(i) Calculate the total of the membership fees received by the club in 2023.

$ .... [2]

(ii) The cost of running the club in 2023 was $2780.

Calculate $2780 as a percentage of the total of the membership fees received by the club.

.... % [1]

(iii) In 2023 there were 120 members.
This was a decrease by 4% of the number of members in 2022.

Calculate the number of members in 2022.

.... [2]

(iv) In 2024 the total number of members increased from the 120 members in 2023.
The number of adult members and the number of child members each increased by the same number.
The ratio   number of adult members : number of child members changed to   14 : 19.

(a) Find the total number of members in 2024.

.... [2]

(b) Calculate the percentage increase in the total number of members from 2023 to 2024.

.... % [2]

(b) The population of a village is 2500.
The population is decreasing exponentially at a rate of 3% per year.

(i) Calculate the population at the end of 3 years.

.... [2]

(ii) Find the number of complete years it takes for the population to first fall below 2000.

.... years [2]

7. 0580_s24_qp_43 Q: 7

(a) (i) A car travels 50 km at an average speed of 75 km/h.

Find the time taken.
Give your answer in minutes.

.... min [2]

(ii) Another car travels 47 km, correct to the nearest kilometre.
The average speed of this car is 75 km/h, correct to the nearest 5 km/h.

Calculate the lower bound of the time taken.
Give your answer in minutes.

.... min [3]

(b) A train travels a total of 240 km.
The train travels for t **minutes** at an average speed of 100 km/h.
It then travels for $(t+60)$ **minutes** at an average speed of 110 km/h.

Find the average speed for the whole journey.

.... km/h [6]

8. 0580_m23_qp_42 Q: 1

(a) (i) Alain and Beatrice share $750 in the ratio Alain : Beatrice = 8 : 7.

Show that Alain receives $400.

[1]

(ii) (a) Alain spends $150.

Write $150 as a percentage of $400.

.... % [1]

(b) He invests the remaining $250 at a rate of 2% per year simple interest.

Calculate the amount Alain has at the end of 5 years.

$ .... [3]

(iii) Beatrice invests her $350 at a rate of 0.25% per **month** compound interest.

Calculate the amount Beatrice has at the end of 5 years.
Give your answer correct to the nearest dollar.

$ .... [3]

(b) Carl, Dina and Eva share 100 oranges.
The ratio Carl's oranges : Dina's oranges = 3 : 5.
The ratio Carl's oranges : Eva's oranges = 2 : 3.

Find the number of oranges Carl receives.

.... [2]

(c) Fred buys a house.
At the end of the first year, the value of the house increases by 5%.
At the end of the second year, the value of the house increases by 3% of its value at the end of the first year.
The value of Fred's house at the end of the second year is $60 564.

Calculate how much Fred paid for the house.

$ .... [3]

(d) Gabrielle invests $500 at a rate of r% per year compound interest.
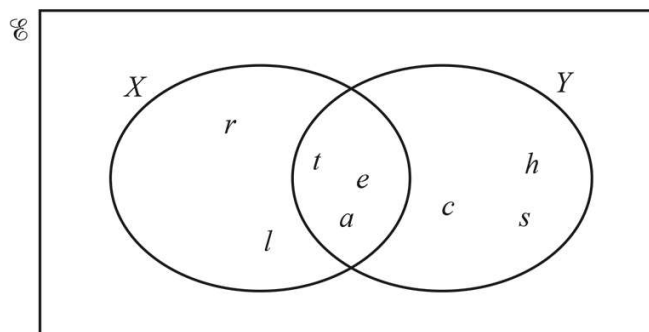At the end of 8 years the value of Gabrielle's investment is $609.20 .

Find the value of r.

$r =$ .... [3]

9. 0580_s23_qp_41 Q: 9

(a) The Venn diagram shows set X and set Y.

(i) List the elements of X.

.... [1]

(ii) Find $n(Y')$.

.... [1]
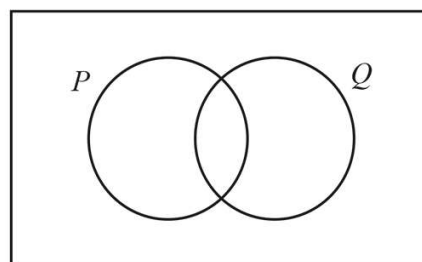
(b) In each Venn diagram, shade the required region.
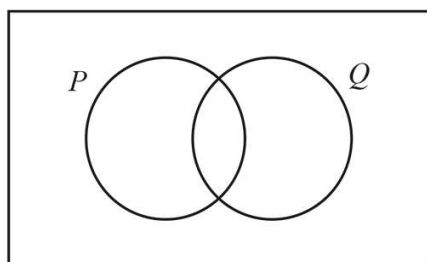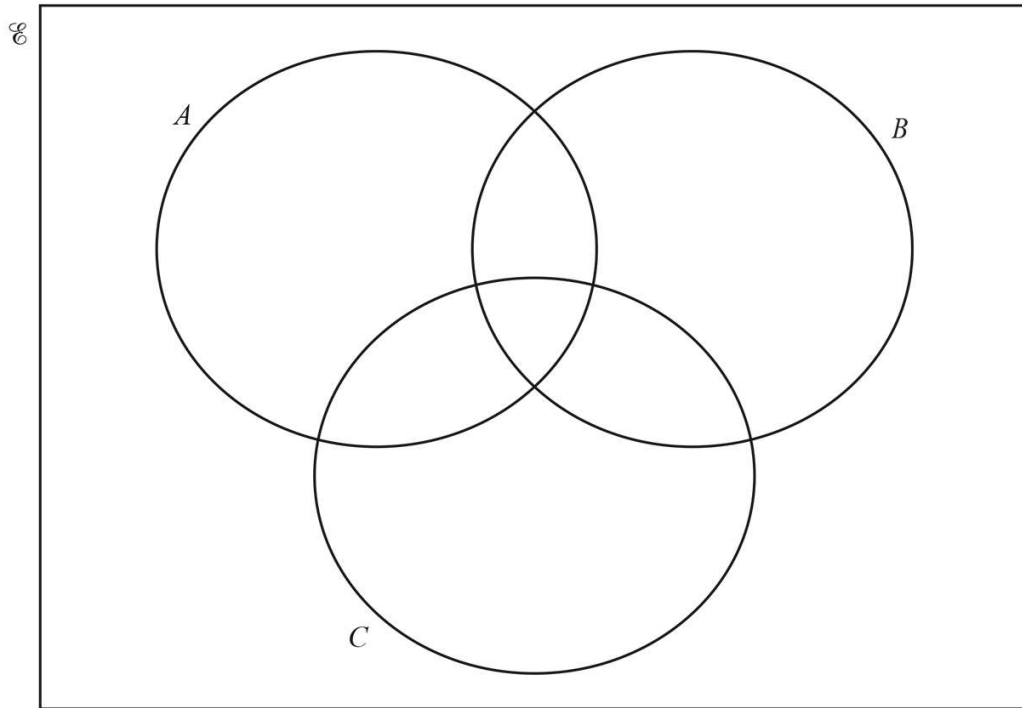

$P \cup Q$ $P' \cap Q$

[2]

(c) $\mathscr{E}$ = {positive integers $<$ 13}

$A = \{x : x < 9\}$

$B = \{x : x \text{ is even}\}$

$C = \{x : x \text{ is a multiple of 3}\}$

(i) Complete the Venn diagram.   [3]

(ii) Find $\mathrm{n}(A' \cup (B \cap C))$.

.... [1]

10. 0580_s23_qp_42 Q: 2

(a) Anil changes $830 into euros when the exchange rate is 1 euro = $1.16 .
He spends 500 euros.
He then changes the remaining money back into dollars at the same exchange rate.

Work out how much, in dollars, Anil receives.

$ .... [3]

(b) In 2021, Anil earns $37 000.

   (i) He spends $12 400 on bills in 2021.

     Calculate the percentage of his earnings he spends on bills.

.... % [2]

   (ii) His earnings of $37 000 increase by 3.2% in 2022.

     Calculate his earnings in 2022.

$ .... [2]

(c) Anil invests $3500 in an account that pays a rate of 2.4% per year compound interest.

    (i) Calculate the total interest earned at the end of 5 years.

$ .... [3]

    (ii) Find the number of complete years before Anil has at least $5000 in this account.

.... years [3]

11. 0580_s23_qp_43 Q: 1

(a) Tomas sells a computer, a bike and a phone.
The amounts he receives are in the ratio   computer : bike : phone = 14 : 17 : 9.

   (i) Calculate the amount he receives for the phone as a percentage of the total.

.... % [2]

  (ii) The total amount he receives is $560.

Calculate how much he receives for the bike.

$ .... [2]

 (iii) Tomas originally bought the bike for $195.
He wanted to make a profit of at least 25% when he sold it.

Does Tomas make a profit of at least 25%?
You must show all your working to support your decision.

[3]

(b) Ulla invests $725 for 6 years in an account paying simple interest at a rate of 1.3% per year.

Calculate the total interest earned at the end of 6 years.

$ .... [2]

(c) In a sale, all prices are reduced by 24%.
Victor pays $36.86 for a pair of shoes in the sale.

Calculate the original price of the shoes.

$ .... [2]

12. 0580_w23_qp_41 Q: 3

(a) The table shows information about some of the planets in the solar system.

Planet	Diameter (km)	Average distance from the Sun (km)
Earth	12 800	1.496×10^8
Mars	6 800	2.279×10^8
Jupiter	143 000	7.786×10^8
Saturn	120 500	1.434×10^9
Neptune	49 500	4.495×10^9

(i) The average distance of Mars from the Sun is 2.279×10^8 km.

Write this distance as an ordinary number.

.... km [1]

(ii) The planet Uranus has a diameter that is 35.8% of the diameter of Jupiter.

Calculate the diameter of Uranus.

.... km [2]

(iii) The ratio   diameter of Neptune : diameter of Saturn   can be written in the form $1 : n$.

Find the value of n.

$n =$ .... [1]

(iv) Find the average distance of Neptune from the Sun as a percentage of the average distance of the Earth from the Sun.

.... % [2]

(v) Distances within the solar system are also measured in astronomical units (AU).
The average distance of Jupiter from the Sun is 5.20 AU.

Calculate the average distance of Mars from the Sun in astronomical units.

.... AU [2]

(vi) The diameter of Mars is 39.2% greater than the diameter of Mercury.

Calculate the diameter of Mercury.

.... km [2]

(b) One light year is the distance that light travels in a year of 365.25 days.
The speed of light is 2.9979×10^5 kilometres per second.

(i) Show that one light year is 9.461×10^{12} km, correct to 4 significant figures.

[2]

(ii) The distance from the Andromeda Galaxy to Earth is 2.40×10^{19} km.

Calculate the time taken for light to travel from this galaxy to Earth.
Give your answer in millions of years.

.... million years [2]

13. 0580_w23_qp_42 Q: 3

(a) The value of Priya's car decreases by 10% every year.
The value today is $7695.

    (i) Calculate the value of the car after one year.

$ .... [2]

    (ii) Calculate the value of the car one year ago.

$ .... [2]

(b) Ali invests $600 at a rate of 2% per year simple interest.

Calculate the value of Ali's investment at the end of 5 years.

$ .... [3]

(c) Sara invests $500 at a rate of r% per year compound interest.
At the end of 12 years, the value of Sara's investment is $601.35, correct to the nearest cent.

Find the value of r.

$r = $ .... [3]

(d) The mass of a radioactive substance decreases exponentially at a rate of 3% each day.

    (i) Find the overall percentage decrease at the end of 10 days.

.... % [2]

    (ii) Find the number of whole days it takes until the mass of this substance is one half of its original amount.

.... [3]

14. 0580_w23_qp_43 Q: 1

The table shows the amount received when exchanging **$100** in some countries.

Country	Amount received for $100
Wales	77.05 pounds
India	7437.05 rupees
China	671.20 yuan
Spain	85.35 euros

(a) Brad changes $250 to Indian rupees.

Calculate the amount he receives correct to the nearest rupee.

.... rupees [2]

(b) Wang changes 5400 Chinese yuan into dollars.

Calculate how much he receives in dollars, correct to the nearest cent.

$ .... [2]

(c) Gretal lives in Spain and goes on holiday to Wales.
She spends 3500 euros in total on travel and hotels in the ratio

$$\text{travel} : \text{hotels} = 4 : 3.$$

(i) Work out how much Gretal spends, in euros, on travel.

.... euros [2]

(ii) Work out how much she spends, **in pounds**, on hotels.

.... pounds [3]

(iii) Gretal flies home to Spain.
The plane flies a distance of 2200 km, correct to the nearest 100 km.
The average speed of the plane is 740 km/h, correct to the nearest 20 km/h.

Calculate the lower bound of the time taken, in hours and minutes, for this flight.

.... h .... min [3]

15. 0580_m22_qp_42 Q: 1

A company employed 300 workers when it started and now employs 852 workers.

(a) Calculate the percentage increase in the number of workers.

.... % [2]

(b) Of the 852 workers, the ratio   part-time workers : full-time workers = 5 : 7.

Calculate the number of full-time workers.

.... [2]

(c) The company makes 40 600 headphones in one year.

Write this number

(i) in words,

.... [1]

(ii) in standard form.

.... [1]

(d) In one month, the company sells 3 000 headphones.
Of these, 48% are exported, $\frac{3}{8}$ are sold to shops and the rest are sold online.

Calculate the number of headphones that are sold online.

.... [3]

(e) One year, sales increased by 15%.
The following year sales increased by 18%.

Calculate the overall percentage increase in sales.

.... % [3]

16. 0580_s22_qp_41 Q: 2

(a) Alex, Bobbie and Chris share strawberries in the ratio   Alex : Bobbie : Chris = 3 : 2 : 2.
Chris receives 12 strawberries.

Calculate the total number of strawberries shared.

.... [2]

(b) In a sale, a shop reduces all prices by 12%.

(i) Dina buys a book which has an original price of $6.50 .

Calculate how much Dina pays for the book.

$ .... [2]

(ii) Elu pays $11 for a toy.

Calculate the original price of the toy.

$ .... [2]

(c) Feri invests some money.
The rate of interest for the first year is 2.5%.
At the end of the second year the overall percentage increase of Feri's investment is 6.6%.

Find the rate of interest for the second year.

.... % [2]

(d) A radioactive substance decays at an exponential rate of 2% per day.
The initial mass is 80 g.

   (i) Find the mass at the end of 5 days.

.... g [2]

   (ii) Find how many **more** whole days, after day 5, it takes for the mass to reduce to less than 67 g.

.... [3]

17. 0580_s22_qp_42 Q: 1

(a) Find the lowest common multiple (LCM) of 30 and 75.

.... [2]

(b) Share $608 in the ratio   4 : 5 : 7.

$ ....

$ ....

$ .... [3]

(c) Work out $\dfrac{6.39 \times 10^4}{2.45 \times 10^6}$.

Give your answer in standard form.

.... [2]

(d) Write $0.2\dot{7}$ as a fraction.

.... [1]

(e) A stone has volume $45\,\text{cm}^3$ and mass $126\,\text{g}$.
Find the density of the stone, giving the units of your answer.

[Density = mass ÷ volume]

.... [2]

18. 0580_s22_qp_43 Q: 1

Here is part of a bus timetable.

Abbots	06 50	08 25	09 20
Callet	07 12	08 47	09 42
North Moor	07 30	09 05	10 00
South Moor	07 37	09 12	10 07
Centre Point	08 00	09 35	10 30

(a) Rashid catches the 09 20 bus at Abbots.

Find the time the bus arrives at South Moor.

.... [1]

(b) Annisa leaves home at 8.27 am and takes 25 minutes to walk to the bus stop at Callet.
She catches the next bus to Centre Point.

Find the total time, in minutes, for her journey from leaving home to arriving at Centre Point.

.... min [2]

(c) The distance from Abbots to Centre Point is 29.4 km.
Each bus takes the same time for the journey.

Calculate the average speed of a bus for this journey.
Give your answer in kilometres per hour.

.... km/h [2]

(d) On one journey, all 56 seats on the bus are filled.
The ratio of adults to children on this journey is   adults : children = 5 : 3.
The cost for an adult ticket is $2.80 .
The cost for a child ticket is $\frac{3}{4}$ of the adult cost.

Work out the total cost of the tickets for this journey.

$ .... [4]

19. 0580_w22_qp_41 Q: 2

(a) Write

    (i) 2994.99 correct to the nearest 10,

    .... [1]

    (ii) 0.983 correct to 1 decimal place,

    .... [1]

    (iii) 2090 correct to 2 significant figures.

    .... [1]

(b) Write down a prime number between 90 and 100.

.... [1]

(c) Write 2^{-6} as a fraction.

.... [1]

(d) Write 0.007 01 in standard form.

.... [1]

(e) Simplify $1.5 \times 10^{x} + 1.5 \times 10^{x-1}$ giving your answer in standard form.

.... [2]

(f) Write $0.3\dot{7}$ as a fraction.
You must show all your working.

.... [2]

20. 0580_w22_qp_41 Q: 4

(a) **(i)** Zak invests $500 at a rate of 2% per year simple interest.

Calculate the value of Zak's investment at the end of 5 years.

$ .... [3]

(ii) Yasmin invests $500 at a rate of 1.8% per year compound interest.

Calculate the value of Yasmin's investment at the end of 5 years.

$ .... [2]

(iii) Zak and Yasmin continue with these investments.

How many **more complete** years is it before the value of Yasmin's investment is greater than the value of Zak's investment?

.... [3]

(b) Xavier buys a car for $2500.
The value of the car decreases exponentially at a rate of 10% each year.

Calculate the value of Xavier's car at the end of 5 years.
Give your answer correct to the nearest dollar.

$ .... [3]

(c) The number of a certain type of bacteria increases exponentially at a rate of $r\%$ each day.
After 22 days, the number of this bacteria has doubled.

Find the value of r.

$r =$ .... [3]

21. 0580_w22_qp_42 Q: 5

(a) The diagram shows the speed–time graph for part of a journey for two vehicles, a car and a bus.
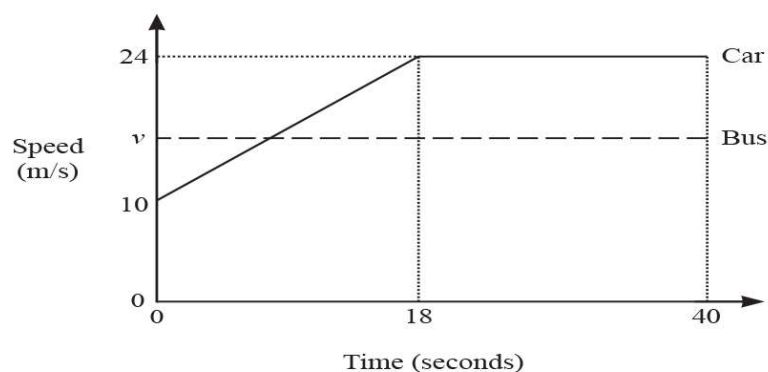
(i) Calculate the acceleration of the car during the first 18 seconds.

.... m/s^2 [1]

(ii) In the first 40 seconds the car travelled 134 m more than the bus.

Calculate the constant speed, v, of the bus.

$v = $ .... m/s [4]

(b) A train takes 10 minutes 30 seconds to travel 16 240 m.

Calculate the average speed of the train.
Give your answer in kilometres per hour.

.... km/h [3]

22. 0580_w22_qp_43 Q: 1

(a) Here are the ingredients needed to make a pasta bake to serve 12 people.

```
250 g butter
600 g pasta
460 g mushrooms
280 g cheese
800 ml milk
```

(i) Find the mass of the cheese as a percentage of the mass of the mushrooms.

.... % [1]

(ii) Find the mass of butter needed to make a pasta bake to serve 18 people.

.... g [2]

(iii) Monica has 2.2 litres of milk and 1.5 kg of each other ingredient.

Calculate the greatest number of people she can serve with pasta bake.

.... [3]

(b) In 2019, a packet of pasta cost $2.40 .
This was an increase of 25% of the cost of a packet in 2018.

(i) Work out the cost in 2018.

$ .... [2]

(ii) In 2020, the cost of a packet increased by 15% from the cost in 2019.

Work out the total percentage increase in the cost of a packet from 2018 to 2020.

.... % [3]

(c)

width

Pasta is sold in packets with width 11.5 cm, correct to the nearest 0.5 cm.
A shop places these packets in a single line on a shelf of length 2 m, correct to the nearest 0.1 m.

Find the maximum number of these packets that will fit along this shelf.
You must show all your working.

.... [3]

23. 0580_m21_qp_42 Q: 1

Painter	Plumber	Electrician
$35 per hour	Fixed charge $40 plus $26.50 per hour	$48 per hour for the first 2 hours then $32 per hour

These are the rates charged by a painter, a plumber and an electrician who do some work for Mr Sharma.

(a) The painter works for 7 hours.

Calculate the amount Mr Sharma pays the painter.

$ .... [1]

(b) Mr Sharma pays the plumber $252.

Calculate how many hours the plumber works.

.... hours [2]

(c) Mr Sharma pays the electrician $224.

Calculate how many hours the electrician works.

.... hours [2]

(d) Write down the ratio of the amount Mr Sharma pays to the painter, the plumber and the electrician. Give your answer in its lowest terms.

painter : plumber : electrician = ... : .... : .... [2]

Appendix A

Answers

1. 0580_m24_ms_42 Q: 1

Question	Answer	Marks	Partial Marks
(a)	8.24 cao	**2**	**M1** for $3 \times 1.04 + 4 \times 1.28$
(b)(i)	32	**2**	**M1** for $\frac{8}{11+8+6}[\times 100]$ oe
(b)(ii)	360	**2**	**M1** for $\frac{1500}{11+8+6} \times k$ where $k = 1$, 11, 8 or 6
(b)(iii)	270	**1**	**FT** $0.75 \times$ *their* 360
(b)(iv)	1.25 cao	**2**	**M1** for $x \times \left(1 - \frac{8}{100}\right) = 1.15$ oe or better
(c)	140 nfww	**3**	**M2** for $\frac{620 \text{ to } 640}{5 - 0.5}$ or $\frac{620 + 10}{4 \text{ to } 5}$ oe or **M1** for $620 + 10$ oe or $620 - 10$ oe or $5 + 0.5$ oe or $5 - 0.5$ oe seen

2. 0580_m24_ms_42 Q: 9

Question	Answer	Marks	Partial Marks
(a)(i)	5	3	**M2** for $\dfrac{(12800-8000)\times100}{8000\times12}$ or **M1** for $[12800-8000=]\dfrac{8000\times12\times r}{100}$ or 400 seen If 0 scored, **SC1** for answer 13.3 or 13.33…
(a)(ii)	4[.0] or 3.99…	3	**M2** for $\sqrt[12]{\dfrac{12800}{8000}}$ or **M1** for $12800=8000\times k^{12}$ for any k

Question	Answer	Marks	Partial Marks
(b)	9 nfww	3	**M2** for $260\,000\times\left(1+\dfrac{1.8}{100}\right)^{8}$ oe evaluated to 4 sf or better or $260\,000\times\left(1+\dfrac{1.8}{100}\right)^{9}$ oe evaluated to 2 sf or better or **M1** for $[300\,000=]\ 260\,000\times\left(1+\dfrac{1.8}{100}\right)^{n}$ oe soi (Accept any inequality sign in [300 000 =])

3. 0580_s24_ms_41 Q: 1

Question	Answer	Marks	Partial Marks
(a)(i)	4.55 or 4.545…	1	
(a)(ii)	50 : 263 : 400 cao	2	**M1**for a correct simplification from 250 000 : 1 315 000 : 2 000 000
(a)(iii)	83 cao	3	**M2** for $\dfrac{43\frac{1}{3}}{100} \times (100 - 60 - 10)$ oe or **M1** for $100 - 60 - 10$ seen
(a)(iv)	10 200 000 cao	3	**B2** for 10 185 185 to 10 185 200 or **M1** for $5\,500\,000 \div 27$ [× 50]
(a)(v)	3.19×10^7 or $3.190… \times 10^7$	3	**B2** for 31903920 or **M1** for $60.7 \times 60 \times 24 \times 365$ If B0 scored **SC1** for correctly converting *their* number seen to standard form to 3sf or better
(b)	2095 nfww	3	**M2** for $6445 - C$ where $4300 \leqslant C < 4400$ oe or $A - 4350$ where $6440 < A \leqslant 6450$ oe or **M1** for $6440 + 5$ or $6440 - 5$ or $4400 + 50$ or $4400 - 50$ seen oe

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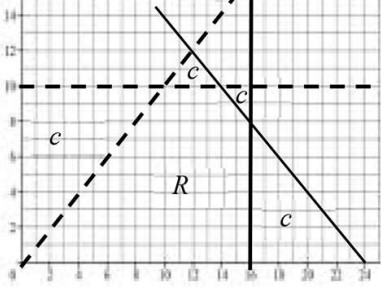
4. 0580_s24_ms_42 Q: 1

Question	Answer	Marks	Partial Marks
(a)	10 : 3 final answer	2	**M1** for 1500 : 450 oe in ratio form If 0 scored **SC1** for answer 3 : 10
(b)	360 240 400	3	**B2** for answer 0.36 0.24 0.4 or for answer two of 360 240 400 or **M1** for $\dfrac{1000}{9+6+10}[\times k]$ where $k = 1, 9,$ 6 or 10 If 0 scored, **SC1** for answer with 3 values in ratio 9 : 6 : 10 in that order
(c)	3.68 cao	2	**M1** for $\left(1+\dfrac{15}{100}\right)\times 3.2$ oe or **B1** for answer 0.48
(d)	18 804[.0...]	2	**1** for $16620\times\left(1+\dfrac{2.5}{100}\right)^{5}$ oe
(e)	3.95	3	**M2** for 22.5 − (18.5 to 18.6) or (22 to 23) −18.55 or **M1** for 23 − 0.5 oe seen or 23 + 0.5 oe seen or 18.5− 0.05 oe seen or 18.5 + 0.05 oe seen

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5. 0580_s24_ms_42 Q: 8

Question	Answer	Marks	Partial Marks
(a)	$y < 10$ $y < x$ oe $x + y \leqslant 24$ oe	3	**B1** for each If 0 scored, **SC1** for $y \leqslant 10$ and $y \leqslant x$ and $x + y < 24$

Question	Answer	Marks	Partial Marks
(b)	Correct lines and region indicated	6	**B1** for each correct line and **B2** for R in correct region for all 4 correct lines or **B1** for R in any one of the regions marked c or **B1** for R that satisfies 3 of the correct inequalities
(c)	228 nfww	2	**M1** for $8x + 12y$ for any (x, y) in *their* R, x, y both integer or $x = 15, y = 9$

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6. 0580_s24_ms_43 Q: 1

Question	Answer	Marks	Partial Marks
(a)(i)	3050	2	**M1** for $50 \times 40 + 70 \times 15$ or better
(a)(ii)	91.1 or 91.14 to 91.15	1	**FT** $\dfrac{2780}{their\,3050} \times 100$
(a)(iii)	125 nfww	2	**M1** for $[...] \times \dfrac{100-4}{100} = 120$ oe
(a)(iv)(a)	132	2	**B1** for increase of 6 in adult or junior or **M1** for 56 : 76 or for multiples of 33 seen 33, 66, 99, 132, … or $50 + x : 70 + x = 14 : 19$ oe or $(70 - 50) \times \dfrac{19+14}{19-14}$ oe or $50 + x = (120 + 2x) \times \dfrac{14}{19+14}$ oe
(a)(iv)(b)	10	2	**FT** $\dfrac{their\,\mathbf{(a)} - 120}{120} \times 100$ dep on *their* **(a)** > 120 **M1** for $\dfrac{their\,\mathbf{(a)} - 120}{120}[\times 100]$ or $\dfrac{their\,\mathbf{(a)}}{120} \times 100\,[-100]$
(b)(i)	2280 or 2281 to 2282 nfww	2	**M1** for $2500 \times \left(1 - \dfrac{3}{100}\right)^3$ oe
(b)(ii)	8	2	**M1** for $2500 \times \left(1 - \dfrac{3}{100}\right)^n$ or 0.97^n evaluated with $n > 3$

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7. 0580_s24_ms_43 Q: 7

Question	Answer	Marks	Partial Marks
(a)(i)	40	2	**M1** for $\frac{50}{75}$ [× 60] oe
(a)(ii)	36 nfww	3	**M2** for $\frac{47-0.5}{75\,\text{to}\,80}$ [× 60] or $\frac{46\,\text{to}\,47}{75+2.5}$ [× 60] or **M1** for 47+0.5 or 47 − 0.5 or 75 + 2.5 or 75− 2.5

Question	Answer	Marks	Partial Marks
(b)	107 or 107.2...	6	**M5** for [speed =] $\dfrac{240}{\left(2 \times \frac{260}{7} + 60\right)} \times 60$ oe OR **B5** for [total time =] 134 or 134.2 to 134.3 or 2.24 or 2.238... or **B4** for ($t = $) 37.1 or 37.14... OR **M2** for $\dfrac{t}{60} \times 100 + \dfrac{t+60}{60} \times 110 = 240$ oe or **M1** for $\dfrac{t}{60} \times 100$ or $\dfrac{t+60}{60} \times 110$ oe **M1** for correct equation of form $at = b$ from *their* equation containing two terms in t and involving the speeds. **M1** for $\dfrac{240}{2 \times their\,t + 60}$ [× 60]

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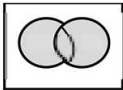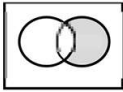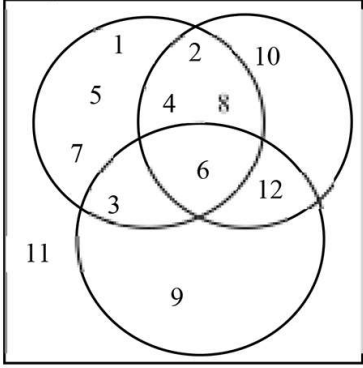
8. 0580_m23_ms_42 Q: 1

Question	Answer	Marks	Partial Marks
(a)(i)	$\dfrac{750}{8+7}\times 8$ [= 400]	M1	
(a)(ii)(a)	37.5	1	
(a)(ii)(b)	275	3	M2 for $250 + \dfrac{250\times 2\times 5}{100}$ oe or M1 for $\dfrac{250\times 2\times 5}{100}$ oe
(a)(iii)	407[.00] cao nfww	3	B2 for 406.5 to 406.7 or M1 for $350\times\left(1+\dfrac{0.25}{100}\right)^{60}$ oe isw If 0 scored SC1 for answer 354 or answer 406
(b)	24	2	M1 for [C : D =] 6 : 10 oe and [C : E =] 6 : 9 oe or for $\dfrac{6}{6+10+9}[\times 100]$ oe

Question	Answer	Marks	Partial Marks
(c)	56 000 nfww	3	M2 for $60564\div\left(1+\dfrac{3}{100}\right)\div\left(1+\dfrac{5}{100}\right)$ oe or M1 for $[x\times]\left(1+\dfrac{3}{100}\right)\times\left(1+\dfrac{5}{100}\right)$ or for $60564\div\left(1+\dfrac{3}{100}\right)$ oe or $60564\div\left(1+\dfrac{5}{100}\right)$ If 0 scored, SC1 for answer 65499 to 65500
(d)	2.5[0] or 2.499...	3	M2 for $\sqrt[8]{\dfrac{609.20}{500}}$ oe or M1 for $500\times(...)^8 = 609.2[0]$ oe

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9. 0580_s23_ms_41 Q: 9

Question	Answer	Marks	Partial Marks
(a)(i)	*r, l, t, e, a*	**1**	
(a)(ii)	2	**1**	
(b)		**1**	
		1	
(c)(i)	Fully correct	**3**	**B2** for 7, 6, or 5 sections correct or **B1** for 4, 3 or 2 sections correct
(c)(ii)	5	**1FT**	strict FT from their diagram

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10. 0580_s23_ms_42 Q: 2

Question	Answer	Marks	Partial Marks
(a)	249.98 to 250[.0...]	**3**	**M2** for 830 – 500 × 1.16 or **M1** for 500 × 1.16 OR **M1** for 830 ÷ 1.16 **M1** for (*their* 715.5... – 500) × 1.16

Question	Answer	Marks	Partial Marks
(b)(i)	33.5 or 33.51…	2	**M1** for $\dfrac{12\,400}{37\,000}$ [$\times 100$] oe If 0 scored, **SC1** for answer 66.5 or 66.48 to 66.49
(b)(ii)	38 184 cao	2	**M1** for $37\,000 \times \left(1 + \dfrac{3.2}{100}\right)$ oe or **B1** for 1184
(c)(i)	441 or 440.6 or 440.64 to 440.65	3	**B2** for answer 3941 or 3940.6 or 3940.64 to 3940.65 or **M2** for $3500 \times \left(1 + \dfrac{2.4}{100}\right)^{5} - 3500$ or **M1** for $3500 \times \left(1 + \dfrac{2.4}{100}\right)^{5}$ oe isw
(c)(ii)	16	3	**B2** for 15[.0] nfww to 15.1 or **M2** for $3500 \times \left(1 + \dfrac{2.4}{100}\right)^{15}$ oe seen or $3500 \times \left(1 + \dfrac{2.4}{100}\right)^{16}$ oe seen or **M1** for (3500 or *their* 3941) $\times \left(1 + \dfrac{2.4}{100}\right)^{n}$ associated with 5000 oe

11. 0580_s23_ms_43 Q: 1

Question	Answer	Marks	Partial Marks
(a)(i)	22.5	**2**	**M1** for $\dfrac{9}{14+17+9}$ [×100]
(a)(ii)	238	**2**	**FT** *their* 14 + 17 + 9 = N seen in **(a)(i)** **M1** for $\dfrac{560}{their\ (14+17+9)} \times k$, where k = 1, 9, 14 or 17
(a)(iii)	METHOD 1 1.25 × 195 oe	**M2**	**M1** for $\dfrac{25}{100} \times 195$
	243[.75] and No oe	**A1**	Strict **FT** yes if *their* **(a)(ii)** > 243.75 If M0 scored, then **SC1** for 243.75 and a correct conclusion.
	METHOD 2 $\dfrac{their\ 238}{195} - 1 = 0.22\ldots$ oe	**(M2)**	**M1** for $\dfrac{their\ 238}{195} = 1.22\ldots$ oe
	22[%] (or better) and No oe	**(A1)**	Strict **FT** yes if *their* **(a)(ii)** gives answer > 25 If M0 scored, then **SC1** for 22.05 and a correct conclusion.
	METHOD 3 195 × 0.25 = 48.75 oe **and** *their* 238 − 195 = 43	**(M2)**	**M1** for 0.25 × 195
	43 **and** 48.75 and NO	**(A1)**	Strict **FT** yes if *their* **(a)(ii)** gives profit > 48.75 If M0 scored, then **SC1** for 43 and 48.75 and a correct conclusion.
	METHOD 4 $\dfrac{their\ 238}{125} \times 100$	**(M2)**	**M1** for $x \times \left(1+\dfrac{25}{100}\right) = their$ 238
	190.4 and NO	**(A1)**	Strict **FT** yes if *their* **(a)(ii)** gives answer > 195 If M0 scored then **SC1** for 190.4 and a correct conclusion.
(b)	56.55	**2**	**M1** for $\dfrac{725\times1.3\,[\times6]}{100}$ oe

Question	Answer	Marks	Partial Marks
(c)	48.5[0]	2	**M1** for $x \times \left(1 - \dfrac{24}{100}\right) = 36.86$ oe

12. 0580_w23_ms_41 Q: 3

Question	Answer	Marks	Partial Marks
(a)(i)	227 900 000	1	

Question	Answer	Marks	Partial Marks
(a)(ii)	51 200 or 51 190 or 51 194	2	**M1** for $\dfrac{35.8}{100} \times 143\,000$ After 0 scored SC1 for answer figs 512 or figs 5119 or figs 51194
(a)(iii)	2.43 or 2.434…	1	
(a)(iv)	3000 or 3004 to 3005	2	**M1** for $\dfrac{4.495 \times 10^9}{1.496 \times 10^8}$ [× 100] oe After 0 scored SC1 for answer figs 3 or figs 3004…. or figs 3005
(a)(v)	1.52 or 1.522…	2	**B1** for 1AU = 1.5[0] × 10^8 or 1.497… × 10^8 [km] or $1\text{km} = 6.68 \times 10^{-9}$ or $6.678… \times 10^{-9}$ [AU] OR **M1** for $\dfrac{5.2 \times 2.279\,[\times 10^8]}{7.786\,[\times 10^8]}$ oe After 0 scored **SC1** for answer figs 152 or figs 1522……
(a)(vi)	4890 or 4885…	2	**M1** for $d \times \left(1 + \dfrac{39.2}{100}\right) = 6800$ oe
(b)(i)	2.9979 × 10^5 × 60^2 × 24 × 365.25	M1	After **M0** **SC1** for 2.9979 × 10^5 × 31557600 oe
	= 9.4606… × 10^{12}	A1	
(b)(ii)	2.54 or 2.536 to 2.537	2	**M1** for $\dfrac{2.4 \times 10^{19}}{9.461 \times 10^{12}}$ oe

13. 0580_w23_ms_42 Q: 3

Question	Answer	Marks	Partial Marks
(a)(i)	6925.5[0] cao	2	**M1** for $7695 \times \dfrac{100-10}{100}$ oe or **B1** for answer 769.5
(a)(ii)	8550	2	**M1** for $X \times \dfrac{100-10}{100} = 7695$ oe

Question	Answer	Marks	Partial Marks
(b)	660	3	**B2** for 60 or **M2** for $600 + \dfrac{600 \times 2 \times 5}{100}$ oe or **M1** for $\dfrac{600 \times 2[\times 5]}{100}$ oe
(c)	1.55 or 1.549 to 1.550	3	**M2** for $\sqrt[12]{\dfrac{601.35}{500}}$ or **M1** for $500 \times (...)^{12} = 601.35$
(d)(i)	26.3 or 26.25 to 26.26	2	**M1** for $[k]\left(\dfrac{100-3}{100}\right)^{10}$ oe
(d)(ii)	23	3	**M2** for a correct trial evaluated with n =22 or $n = 23$ or **M1** for $[k](0.97)^n < 0.5[k]$ oe soi or for $[k](0.97)^n = 0.5[k]$ oe soi, implied by one correct trial $n > 10$ or for $[k](0.97)^{23}$ oe seen If 0 scored **SC1** for answer 22

14. 0580_w23_ms_43 Q: 1

Question	Answer	Marks	Partial Marks
(a)	18593 cao	2	**M1** for $7437.05 \times 250 \div 100$ oe
(b)	804.53 cao	2	**M1** for $5400 \div 671.20$ [$\times 100$] oe
(c)(i)	2000	2	**M1** for $3500 \div (4+3)$ [$\times k$] oe
(c)(ii)	1354.13 …	3	**M2** for $(3500 - their\ \textbf{(c)(i)}) \times \dfrac{77.05}{85.35}$ oe or **M1** for $(3500 - their\ \textbf{(c)(i)}) \div$ figs 85.35 oe or for $\dfrac{77.05}{85.35}$ oe or for $(3500 - their\ \textbf{(c)(i)}) \times$ figs 77.05
(c)(iii)	2 [h] 52 [min] nfww	3	**M2** for $\dfrac{2100\ \text{to}\ 2200}{740 + 10}$ or $\dfrac{2200 - 50}{740\ \text{to}\ 760}$ or **M1** for $2200 + 50$ or $2200 - 50$ or $740 + 10$ or $740 - 10$

15. 0580_m22_ms_42 Q: 1

Question	Answer	Marks	Partial Marks
(a)	184	2	**M1** for $\dfrac{852 - 300}{300}$ [$\times 100$] oe or for $\dfrac{852}{300} \times 100$ [-100] oe
(b)	497	2	**M1** for $\dfrac{852}{5+7} \times k$ oe where $k = 1, 5$ or 7
(c)(i)	Forty thousand six hundred	1	
(c)(ii)	4.06×10^4	1	
(d)	435	3	**M2** for $3000 \times \left(1 - \dfrac{48}{100} - \dfrac{3}{8}\right)$ oe or **B2** for 2565, or 1440 **and** 1125 or 1875 **and** 1440 or 1560 **and** 1125 or **M1** for $1 - \dfrac{48}{100} - \dfrac{3}{8}$ or $3000 \times \left(\dfrac{48}{100} + \dfrac{3}{8}\right)$ oe or **B1** for 1440 or 1125 or 1560 or 1875 If 0 scored **SC1** for answer 975
(e)	35.7	3	**M2** for $\dfrac{100 + 15}{100} \times \dfrac{100 + 18}{100}$ [-1] oe or better or **M1** for $k \times \dfrac{100 + 15}{100} \times \dfrac{100 + 18}{100}$ oe

16. 0580_s22_ms_41 Q: 2

Question	Answer	Marks	Partial Marks
(a)	42	**2**	**M1** for $12 \div 2$ or better
(b)(i)	5.72	**2**	**M1** for $\dfrac{100-12}{100} \times 6.50$ oe or **B1** for 0.88 oe
(b)(ii)	12.5[0]	**2**	**M1** for $\dfrac{100-12}{100} \times x = 11$ or better oe

Question	Answer	Marks	Partial Marks
(c)	4	**2**	**M1** for $\dfrac{100+2.5}{100} \times [...] = \dfrac{100+6.6}{100}$ oe
(d)(i)	72.3 or 72.31...	**2**	**M1** for $80 \times \left(\dfrac{100-2}{100}\right)^5$ oe
(d)(ii)	4 nfww	**3**	**B2** for answer 9 nfww or **M2** for correct trials with values giving either side of 67 or **M1** for $80 \times \left(\dfrac{100-2}{100}\right)^n = 67$ or *their* $(i) \times \left(\dfrac{100-2}{100}\right)^k = 67$ or an evaluated trial with $n \geqslant 6$ or $k \geqslant 1$

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17. 0580_s22_ms_42 Q: 1

Question	Answer	Marks	Partial Marks
(a)	150	2	**B1** for answer 150k or **M1** for prime factors of 30 or 75 seen or a list of multiples of both 30 and 75 with at least 3 of each or for $\dfrac{30\times 75}{15}$ oe or for answer $2 \times 3 \times 5^2$
(b)	152 190 266	3	Accept in any order **B2** for two correct answers or **M1** for $\dfrac{608}{4+5+7}\times k$ oe where k =1, 4, 5, 7
(c)	2.61×10^{-2} 2.61×10^{-2} or $2.608\ldots \times 10^{-2}$	2	**B1** for figs 2608 or 261 seen If 0 scored, **SC1** for answer $2.6[0] \times 10^{-2}$ without more accurate value in standard form seen
(d)	$\dfrac{27}{99}$ oe fraction	1	
(e)	2.8	1	
	g/cm^3 or g cm^{-3}	1	

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18. 0580_s22_ms_43 Q: 1

Question	Answer	Marks	Partial Marks
(a)	10 07	1	
(b)	123	2	**M1** for 10 30 − 8 27 soi or 10 30 − 8 52 + 25 soi or 25 + 50 + 48
(c)	25.2, $25\dfrac{1}{5}$	2	**M1** for figs 29.4 ÷ 70 [× 60] oe
(d)	\$142.1[0] cao	4	**M2** for [adults =] 56 ÷ 8 × 5 and [child =] 56 ÷ 8 × 3 or better or **M1** for 56 ÷ (5 + 3) × k where k = 1, 3 or 5 **M1** for *their* 35 × 2.80 + *their* 21 × 2.80 × $\dfrac{3}{4}$ oe

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19. 0580_w22_ms_41 Q: 2

Question	Answer	Marks	Partial Marks
(a)(i)	2990 cao	1	
(a)(ii)	1.0 cao	1	
(a)(iii)	2100 cao	1	
(b)	97	1	
(c)	$\frac{1}{64}$ final answer	1	
(d)	$7.01[0] \times 10^{-3}$	1	
(e)	1.65×10^x	2	**M1** for final answer figs 165 or for $15 \times 10^{x-1}$ seen or for 0.15×10^x seen

Question	Answer	Marks	Partial Marks
(f)	$37.7... - 3.7...$ [= 34] oe	**M1**	
	$\frac{34}{90}$ oe fraction	**B1**	

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20. 0580_w22_ms_41 Q: 4

Question	Answer	Marks	Partial Marks
(a)(i)	550 nfww	3	**M2** for $\frac{500 \times 2 \times 5}{100} + 500$ oe or **M1** for $\frac{500 \times 2 \times 5}{100}$ oe
(a)(ii)	546.65	2	**M1** for $500 \times \left(1 + \frac{1.8}{100}\right)^5$ oe
(a)(iii)	8 nfww	3	**B2** for final answer 13 OR **M2** for trials correctly comparing both investments to 7 and 8 more years or **M1** for at least two trials correctly comparing both investments

Question	Answer	Marks	Partial Marks
(b)	1476 cao	3	**B2** for 1480 or 1476.2 ... OR **M1** for $2500 \times \left(1 - \frac{10}{100}\right)^5$ oe **B1** for their more accurate answer seen correctly rounded to the nearest dollar.
(c)	3.2[0] or 3.200 to 3.201	3	**M2** for $(...) = \sqrt[22]{2}$ oe isw or **M1** for $[N] \times (...)^{22} = 2[N]$

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21. 0580_w22_ms_42 Q: 5

Question	Answer	Marks	Partial Marks
(a)(i)	$\frac{14}{18}$ oe	1	
(a)(ii)	17.5	4	**M3** for $\frac{1}{2}(10+24)18 + 22 \times 24 - 134 = 40v$ oe or **M2** for $\frac{1}{2}(10+24)18 + 22 \times 24$ oe or **B2** for [distance covered by bus =] 700 or **M1** for correct method for any partial area for the car or for $40v$
(b)	92.8 or $92\frac{4}{5}$	3	**M1** for $\dfrac{figs162[4]}{their\,10\,min\,30\,sec}$ oe **M1** for correct conversion to km/h, e.g. $\times \dfrac{60}{1000}$

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22. 0580_w22_ms_43 Q: 1

Question	Answer	Marks	Partial Marks
(a)(i)	60.9 or 60.86 to 60.87	1	
(a)(ii)	375	2	**M1** for $\dfrac{250}{12}$ [× 18] oe
(a)(iii)	30 nfww	3	**M1** for figs2200 ÷ 800 [× 12]oe **M1** for 1500 ÷ 600 [× 12] oe
(b)(i)	1.92	2	**M1** for $k \times \left(1 + \dfrac{25}{100}\right) = 2.4[0]$ oe or better
(b)(ii)	43.75 or $43\dfrac{3}{4}$	3	**M2** for $\left(\left(1 + \dfrac{25}{100}\right) \times \left(1 + \dfrac{15}{100}\right)[-1]\right)[\times 100]$ oe or $\left(1 + \dfrac{25}{100}\right) \times \left(1 + \dfrac{15}{100}\right) \times 100\,[-100]$ or for $\dfrac{2.40 \times \left(1 + \dfrac{15}{100}\right)}{their\,\mathbf{(b)(i)}} \times 100\ [-100]$ oe or **M1** for $2.40 \times \left(1 + \dfrac{15}{100}\right)$ or $\left(1 + \dfrac{25}{100}\right) \times \left(1 + \dfrac{15}{100}\right)$ oe
(c)	18 nfww	3	**M2** for $\dfrac{200 \text{ to } 210}{11.5 - 0.25}$ or $\dfrac{200 + 5}{11 \text{ to } 11.5}$ oe or **M1** for 200 + 5, 200 − 5, 11.5 + 0.25 or 11.5 − 0.25

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23. 0580_m21_ms_42 Q: 1

	Answer	Mark	Partial Marks
(a)	245	1	
(b)	8	2	**M1** for $40 + 26.5x = 252$ oe or **B1** for 212 seen
(c)	6	2	**M1** for $(224 - 2 \times 48) \div 32$ oe or $2 \times 48 + 32\,(x - 2) = 224$ soi
(d)	35 : 36 : 32 final answer	2	**B1** for *their* (a) : 252 : 224 or equivalent ratio

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