Topical Past Paper Questions Worksheets

IGCSE International Mathematics (0607)
Paper 4 [Extended]

Exam Series: May/June 2015 - May/June 2024

Format Type B:
Each question is followed by its answer scheme

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Introduction

Each Topical Past Paper Questions Workbook 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 International Mathematics (0607) Paper 4 Topical Past Papers
- Subtitle: Exam Practice Worksheets With Answer Scheme
- Examination board: Cambridge Assessment International Education (CAIE)
- Subject code: 0607
- Years covered: May/June 2015 - May/June 2024
- Paper: 4
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Chapter 1

Number

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1. 0607_s24_qp_41 Q: 4

(a) The price of a coat is \$84.
The price is reduced by 12%.

Find the new price of the coat.

\$ ..... [2]

(b) The price of a table is reduced by 25%.
The price is now \$960.

Find the original price of the table.

\$ ..... [2]

(c) Samir invests \$600 in a bank that pays compound interest at a rate of 5.1% each year.

(i) Find the value of Samir's investment after 4 complete years.

\$ ..... [2]

(ii) Find the number of complete years for the value of Samir's investment to be first worth more than \$1000.

..... [4]

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(d) Amir and Bob work together and share their earnings in the ratio $3 : 5$.

(i) Find the amount Bob receives when their earnings are \$120.

\$ ..... [2]

(ii) They decide to change the ratio for all further earnings.
Amir's share of the earnings is increased by 20% of his original share.
Bob's share of the earnings is decreased by 20% of his original share.

Show that the ratio of their earnings is now $9 : 10$.

[3]

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Answer:

Question	Answer	Marks	Partial Marks
(a)	73.92	**2**	**M1** for $84\times\frac{(100-12)}{100}$ soi or **B1** for 10.08
(b)	1280	**2**	**M1** for $x\times\frac{100-25}{100}=960$ oe
(c)(i)	732.09	**2**	**M1** for 600×1.051^4 oe
(c)(ii)	11	**4**	**B3** for 10.3 or 10.26 to 10.27 or **M3** for $n\log1.051=\log\frac{1000}{600}$ or good sketch indicating value between 10 and 11 or correct trials reaching 10 and 11 or **M2** for $1.051^n=\frac{1000}{600}$ oe or sketch that could lead to solution e.g. $y=1.051^x$, $y=1.67$ or at least 3 correct trials with $n>4$ or **M1** for $600\times1.051^n=1000$ oe or suitable graph e.g. $y=1.051^x$ or at least 2 trials with $n>4$
(d)(i)	75	**2**	**M1** for $[120\times]\frac{5}{5+3}$ oe
(d)(ii)	$3[k](1+0.2):5[k](1-0.2)$	**M2**	**M1** for $5[k](1-0.2)$ or $3[k](1+0.2)$ or for *their* **(d)(i)**$(1-0.2)$
	Leading to $9:10$	**A1**	No errors seen

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2. 0607_s24_qp_42 Q: 2

(a) Yuri and Zoe share some money in the ratio 8 : 7.
Zoe receives $210.

Show that Yuri receives $240.

[1]

(b) Yuri uses some of his money to buy a set of books and a concert ticket.

(i) He spends 21% of his $240 on the set of books.

Calculate the cost of the set of books.

$ ..... [1]

(ii) He spends $75.50 on the concert ticket.

Calculate the amount Yuri has remaining as a percentage of the $240.

..... % [2]

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(c) Zoe spends \$140 on software.
She is given a discount of 20% on the original price of the software.

Calculate the original price of the software.

\$ ..... [2]

(d) Find the ratio Yuri's remaining money : Zoe's remaining money.
Give your answer in the form n : 1.

..... : 1 [2]

Answer:

Question	Answer	Marks	Partial Marks
(a)	$\frac{210}{7}\times 8$ oe	**M1**	
(b)(i)	50.4[0]	**1**	
(b)(ii)	47.5 or 47.54...	**2**	**M1** for $\frac{75.50+their\textbf{(i)}}{240}\times 100$ or $\frac{240-(75.50+their\textbf{(i)})}{240}$
(c)	175	**2**	**M1** for $X\times\frac{100-20}{100}=140$ oe or better
(d)	1.63 [: 1]	**2**	**M1** for (240 – 75.50 – *their* **(b)(i)**) : (210 – 140) or $\frac{8}{7}\times 47.5$: 33.3 oe

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3. 0607_s24_qp_42 Q: 6

Xavier started a new job in 2000.
His annual pay increases each year by 2.5% of his pay in the previous year.

(a) Calculate the number of complete years it took for Xavier's annual pay to be 30% greater than his annual pay in 2000.

..... [4]

(b) In 2024 Xavier's annual pay is $25 215.

Calculate the amount Xavier's pay will increase from his annual pay in 2022 to his annual pay in 2027.
Give your answer correct to the nearest dollar.

$ ..... [4]

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Answer:

Question	Answer	Marks	Partial Marks
(a)	11 cao	**4**	**B3** for 10.6 or 10.62 to 10.63 OR or **M3** for $n\log\left(1+\frac{2.5}{100}\right)=\log\left(\frac{130}{100}\right)$ oe or good sketch indicating value between 10 and 11 or correct trials reaching 10 and 11 or **M2** for $\left(1+\frac{2.5}{100}\right)^n=\frac{130}{100}$ oe or suitable graph with $n>1$ or at least 3 correct trials or **M1** for $[...]\times\left(1+\frac{2.5}{100}\right)^n=\frac{130}{100}\times[...]$ oe soi by at least 2 trials with $n>1$
(b)	3154 cao	**4**	**B3** for 3153.7 to 3153.8 OR **M3** for $25215\times1.025^3-\frac{25215}{1.025^2}$ oe OR **M1** for $X\times\left(1+\frac{2.5}{100}\right)^2=25215$ **M1** for $25215\times\left(1+\frac{2.5}{100}\right)^3$ or for *their* $24000\times\left(1+\frac{2.5}{100}\right)^5$ oe provided *their* 2027 amount is greater than 25215

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4. 0607_s24_qp_43 Q: 2

(a) Ameera and Bertrand share some money in the ratio 4 : 5.
Bertrand gets $3000.

Calculate Ameera's share.

$ ..... [2]

(b) Bertrand invests $3000 at a rate of r% per year simple interest.
At the end of 10 years the value of the investment is $3840.

Find the value of r.

r = ... [3]

(c) Claudia invests $6000 at a rate of s% per year compound interest.
At the end of 8 years the value of the investment is $7367.67 .

Find the value of s.

s = ... [3]

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(d) Dieter invests \$4000 at a rate of 1.8% per year compound interest.
At the end of n complete years the value of the investment is more than \$6000.

Calculate the smallest value of n.

$n =$ ..... [4]

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Answer:

Question	Answer	Marks	Partial Marks
(a)	2400	**2**	**M1** for $\frac{3000}{5}$
(b)	2.8	**3**	**M2** for $\frac{3000\times r\times 10}{100} = 840$ oe or **M1** for $\frac{3000\times r\times 10}{100}$ or **B1** for [1 year interest] = 84
(c)	2.6[0]	**3**	**M2** for $\sqrt[8]{\frac{7367.67}{6000}}$ oe or **M1** for $6000(.....)^8 = 7367.67$
(d)	23 cao	**4**	**B3** for 22.7 or 22.72 to 22.73 OR **M3** $n\log\left(1+\frac{1.8}{100}\right)=\log\left(\frac{6000}{4000}\right)$ oe or good sketch indicating value between 22 and 23 or correct trials reaching 22 and 23 or **M2** for $\left(1+\frac{1.8}{100}\right)^n=\frac{6000}{4000}$ oe or suitable graph with $n > 1$ or at least 3 correct trials or **M1** for $4000\times\left(1+\frac{1.8}{100}\right)^n = 6000$ oe soi by at least 2 correct trials with $n > 1$

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5. 0607_m23_qp_42 Q: 9

Henryk invests \$5000 in Bank *A* and \$5000 in Bank *B*.

(a) Bank *A* pays compound interest at a rate of 3.5% each year.

(i) Find the total amount Henryk has in Bank *A* at the end of 4 years.

\$ ..... [2]

(ii) Calculate the number of complete years it takes for the value of Henryk's investment of \$5000 in Bank *A* to be first greater than \$8000.

..... [4]

(b) Bank *B* pays simple interest at a rate of 4% each year.

(i) Find the total amount Henryk has in Bank *B* at the end of 4 years.

\$ ..... [3]

(ii) Calculate the number of complete years it takes for the value of Henryk's investment of \$5000 in Bank *B* to be \$8000.

..... [2]

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(c) At the end of x complete years, the total amount that Henryk has in Bank A is greater than the total amount he has in Bank B.

Given that $5 < x < 10$, use a graphical method to find the value of x.

$x =$ ..... [4]

Answer:

Question	Answer	Marks	Partial Marks
(a)(i)	5737.62	**2**	**M1** for 5000×1.035^4 oe

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Question	Answer	Marks	Partial Marks
(a)(ii)	14	**4**	**B3** for 13.6 to 13.7 OR **M3** for $n\log 1.035 = \log\frac{8000}{5000}$ oe or good sketch indicating value between 13 and 14 or correct trials reaching 13 and 14 or **M2** for $1.035^n = \frac{8000}{5000}$ oe or exponential sketch or at least 3 correct trials with $n > 4$ or **M1** for $5000 \times 1.035^n = 8000$ oe or at least 2 correct trials If 0 scored, **SC3** for answer 2 coming from use of 1.35
(b)(i)	5800	**3**	**M2** for $5000 + \frac{5000\times 4\times 4}{100}$ oe or **M1** for $\frac{5000\times 4\times 4}{100}$ oe
(b)(ii)	15	**2**	**M1** for $5000 + \frac{5000\times 4\times n}{100} = 8000$ oe
(c)	9	**4**	**B3** for 8.556… or 8.56 OR **M1** for $5000\times 1.035^n = 5000(1+0.04n)$ oe soi **M1** for sketch of 1.035^n **M1** for sketch of $1+0.04n$

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6. 0607_s23_qp_41 Q: 4

(a) Alex invests \$650 at a rate of 2% per year compound interest.

(i) Calculate the value of this investment at the end of 10 years.

\$ ..... [2]

(ii) Calculate the number of complete years it takes for the value of this investment of \$650 to be first greater than \$1000.

..... [4]

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(b) 2 years ago Chris invested $\$x$ at a rate of 3% per year compound interest.
The value of this investment is now \$607.90 correct to the nearest cent.

Calculate the value of x.

$x =$ ..... [2]

(c) Sam invested \$200 at a rate of r% per year compound interest.
At the end of 18 years, the value of this investment is \$247.90 correct to the nearest cent.

Find the value of r.

$r =$ ..... [3]

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Answer:

Question	Answer	Marks	Partial Marks
(a)(i)	792 or 792.35	**2**	**M1** for $650\times\left(1+\frac{2}{100}\right)^{10}$
(a)(ii)	22	**4**	**B3** for 21.8 or 21.75... OR **M3** for $n\log\left(1+\frac{2}{100}\right)=\log\left(\frac{1000}{650}\right)$ oe or sketch indicating value between 21 and 22 or correct trials as far as 21 and 22 or **M2** for $\left(1+\frac{2}{100}\right)^{n}=\frac{1000}{650}$ oe or graph which could lead to solution, e.g. $y=1.02^{x}$ and $y=\frac{1000}{650}$ or at least 3 correct trials with $n > 10$ or **M1** for $650\left(1+\frac{2}{100}\right)^{n}=1000$ oe or at least 2 correct trials
(b)	573	**2**	**M1** for $(...)\times\left(1+\frac{3}{100}\right)^{2}=607.90$ oe
(c)	1.2[0] or 1.199 to 1.200	**3**	**M2** for $\sqrt[18]{\frac{247.9}{200}}$ or **M1** for $200\times[\ldots]^{18}=247.90$ oe or better

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7. 0607_s23_qp_41 Q: 11

(a) (i) Write 0.000 021 in standard form.

..... [1]

(ii) Calculate $\left(7.3\times10^{-11}\right)\times\left(4.7\times10^{-7}\right)$, giving your answer in standard form.

..... [1]

(iii) Calculate $\left(3.2\times10^{-200}\right)\div\left(4\times10^{-100}\right)$, giving your answer in standard form.

..... [2]

(iv) Simplify $\left(5\times10^{p}\right)^{2}$, giving your answer in standard form.

..... [2]

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(b) $y = 10^x$

Write x in terms of y.

$x =$ ..... [1]

(c) Solve $7^x = 14$.

$x =$ ..... [1]

(d) $\log y = 1 + 3\log x - \frac{1}{2}\log w$

Find y in terms of x and w.

$y =$ ..... [4]

Answer:

Question	Answer	Marks	Partial Marks
(a)(i)	2.1×10^{-5}	**1**	
(a)(ii)	3.431×10^{-17}	**1**	
(a)(iii)	8×10^{-101}	**2**	**B1** for 0.8×10^{-100} seen
(a)(iv)	$2.5\times10^{2p+1}$	**2**	**B1** for 25×10^{2p} or $2.5\times10\times10^{2p}$ seen
(b)	$\log y$ or $\log_{10} y$ final answer	**1**	

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Question	Answer	Marks	Partial Marks
(c)	1.36 or 1.356… or $\frac{\log 14}{\log 7}$ or $\log_7 14$ final answer	**1**	
(d)	$\frac{10x^3}{\sqrt{w}}$ or $\frac{10x^3}{w^{\frac{1}{2}}}$ or $10x^3w^{-\frac{1}{2}}$ or $\frac{10x^3\sqrt{w}}{w}$ final answer	**4**	**M1** log10 soi **M1** for $\log w^{\frac{1}{2}}$ or $\log\sqrt{w}$ or $\log x^3$ **M1** for correct use of $\log p - \log q = \frac{p}{q}$ or correct use of $\log p + \log q = \log pq$

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8. 0607_s23_qp_42 Q: 2

The population of a species of bird is estimated to be decreasing by 4% per year.
At the end of 2020 the population was 4.32 million.

(a) Find the population at the end of 2019.

..... million [2]

(b) Calculate an estimate for the population at the end of 2025.

..... million [2]

(c) Find the year in which the population is first expected to be below 2 million.

..... [4]

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Answer:

Question	Answer	Marks	Partial Marks
(a)	4.5 nfww	**2**	**M1** for $P\left(1-\frac{4}{100}\right)=4.32$ oe or better
(b)	3.52 or 3.522... nfww	**2**	**M1** for $4.32\left(1-\frac{4}{100}\right)^5$ oe
(c)	2039 nfww	**4**	**B3** for answer 18.9 or 18.86 to 18.87 or 19 nfww OR **M3** for $n\log\left(1-\frac{4}{100}\right)=\log\left(\frac{2}{4.32}\right)$ oe or good sketch indicating value between 18 and 19 or correct trials as far as 18 and 19 or **M2** for $\left(1-\frac{4}{100}\right)^n=\frac{2}{4.32}$ oe or sketch that could lead to solution or at least 3 correct trials or **M1** for $4.32\times\left(1-\frac{4}{100}\right)^n=2$ soi. or at least 2 correct trials

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9. 0607_s23_qp_43 Q: 2

A triathlon race consists of three parts:

- a 1500 m swim
- a 40 km bike ride
- a 10 km run.

(a) John swims the 1500 m in 25 minutes.

Find his average speed, in km/h, for this swim.

..... km/h [2]

(b) John completes the 40 km bike ride at an average speed of 32 km/h.

Find the time, in minutes, for John to complete this bike ride.

..... min [2]

(c) John completes the whole race at an average speed of 20.6 km/h.

Find the average speed, in km/h, for John to complete his 10 km run.

..... km/h [3]

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Answer:

Question	Answer	Marks	Partial Marks
(a)	3.6 oe	**2**	**M1** for $\frac{1500}{25}$ or $\frac{1.5}{25}$ or figs$15 \div \frac{25}{60}$
(b)	75	**2**	**M1** for $\frac{40}{32}$
(c)	12	**3**	**M1** for $51.5 \div 20.6$ oe **M1** for $10 \div (their150 - 25 - their(b))[\times 60]$ oe

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10. 0607_s23_qp_43 Q: 4

(a) $\$x$ is divided in the ratio 3 : 5.
The larger share is \$42.

Find the value of x.

$x =$ ..... [2]

(b) **(i)** Increase 124 by 16%.

..... [2]

(ii) The price of a coat is reduced by $\frac{2}{9}$ in a sale.
The new price of the coat is \$73.50 .

Find the original price of the coat.

\$ ..... [2]

(c) Xiong invests \$2000 in Bank *A* which pays simple interest at a rate of 3% each year.

Find the total amount of interest Xiong receives at the end of 5 years.

\$ ..... [2]

(d) Wendi invests \$400 in Bank *B* which pays compound interest at a rate of 1.6% each year.

Find the total amount of interest Wendi receives at the end of 3 years.

\$ ..... [3]

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(e) Pedro invests \$1000 in Bank C for 18 years.
Pedro also invests \$1000 in Bank D for 18 years.

Bank C pays simple interest at a rate of $x\%$ each year.
Bank D pays compound interest at a rate of $0.7x\%$ each year.
At the end of 18 years Pedro has exactly the same amount of money in Bank C and Bank D.

(i) Show that $1+\frac{18x}{100}=\left(1+\frac{0.7x}{100}\right)^{18}$.

[2]

(ii) Given that $5 < x < 7$, use a graphical method to find x.

$x =$ ..... [3]

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Answer:

Question	Answer	Marks	Partial Marks
(a)	67.2[0]	**2**	**M1** for $42 \div 5[\times k]$ where k is 8 or 3 or 1
(b)(i)	143.84 cao	**2**	**M1** for $124 \times (1 + \frac{16}{100})$ oe or **B1** for 19.84 or 143.84 seen
(b)(ii)	94.5 [0]	**2**	**M1** for $\left(1 - \frac{2}{9}\right)x = 73.5$ oe
(c)	300	**2**	**M1** for $2000 \times [0].03 \times 5$ oe

Question	Answer	Marks	Partial Marks
(d)	19.51	**3**	**M2** for $400 \times \left(1 + \frac{1.6}{100}\right)^3 - 400$ oe or **M1** for $400 \times \left(1 + \frac{1.6}{100}\right)^3$ oe
(e)(i)	$1000 + \frac{1000 \times x \times 18}{100}$ oe	**M1**	
	$1000\left(1 + \frac{0.7x}{100}\right)^{18}$ oe	**M1**	
(e)(ii)	5.76 or 5.756...	**3**	**M2** for sketch of $[y =]\left(1 + \frac{18x}{100}\right)$ and $[y =]\left(1 + \frac{0.7x}{100}\right)^{18}$ oe with distinct curve and line with clear point of intersection or **M1** for sketch of $[y =]\left(1 + \frac{18x}{100}\right)$ or $[y =]\left(1 + \frac{0.7x}{100}\right)^{18}$ oe

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11. 0607_w23_qp_41 Q: 1

(a) Find \$2.40 as a percentage of \$1.60 .

..... % [1]

(b) Calculate 7.2% of 2.5 g.

..... g [2]

(c) Amir invests \$400 at a rate of 1.8% per year compound interest.

Calculate the value of this investment at the end of 6 years.

\$ ..... [2]

(d) Each year the population of a small town increases by 4% of its value in the previous year. The population is now 29 640.

(i) Calculate the population last year.

..... [2]

(ii) Calculate the number of complete years it will take for the population of 29 640 to be first greater than 40 000.

..... years [4]

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Answer:

Question	Answer	Marks	Partial Marks
(a)	150	**1**	
(b)	[0].18	**2**	**M1** for $\frac{7.2}{100}\times 2.5$ oe
(c)	445.19 or 445 or 445.19...	**2**	**M1** for $400\times\left(\frac{100+1.8}{100}\right)^6$ oe
(d)(i)	28 500	**2**	**M1** for $[...]\times\left(\frac{100+4}{100}\right)=29640$ oe
(d)(ii)	8 nfww	**4**	**B3** for 7.64 or 7.642 to 7.643 or **M3** $n\log\left(1+\frac{4}{100}\right)=\log\left(\frac{40000}{29640}\right)$ oe or for good sketch indicating value between 7 and 8 or for correct trials reaching 7 and 8 or **M2** for $\left(1+\frac{4}{100}\right)^n=\frac{40000}{29640}$ oe or suitable graph with $n > 1$ or at least 3 correct trials or **M1** for $29640\times\left(1+\frac{4}{100}\right)^n=40000$ oe soi by at least 2 trials with $n > 1$

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12. 0607_w23_qp_41 Q: 6

(a) Jade and Kim share \$160.
Jade receives \$8 more than Kim.

Find the ratio Jade's money : Kim's money.
Give your answer in its simplest form.

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

(b) Each year the height of a bush increases by x% of its height at the start of the year.
It takes 6 years for the bush to grow from 1.2 m to 1.664 m.

Find the value of x.

$x =$ ..... [3]

(c) Work out, giving each answer in standard form.

(i) $(4.5 \times 10^{85}) \times (3 \times 10^{36})$

..... [2]

(ii) $(2 \times 10^{n}) + (2 \times 10^{n-2})$

..... [2]

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Answer:

Question	Answer	Marks	Partial Marks
(a)	21 : 19 cao	**2**	**B1** for answer 84 : 76 or **M1** for $\frac{1}{2}(160)+4$ or $\frac{1}{2}(160)-4$ If 0 scored, **SC1** for final answer of 19 : 21
(b)	5.6[0] or 5.599 to 5.600	**3**	**M2** for $\sqrt[6]{\frac{1.664}{1.2}}$ oe or **M1** for $1.2 \times [...]^6 = 1.664$
(c)(i)	1.35×10^{122} cao	**2**	**B1** for 13.5×10^{121} oe seen
(c)(ii)	2.02×10^{n} cao	**2**	**B1** for figs 202

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13. 0607_w23_qp_42 Q: 6

(a) **(i)** Kayla walks from A to B on a bearing of 105°.
She then walks back to A.

Calculate the bearing Kayla walks from B to A.

..... [2]

(ii) The distance from A to B is 1.5 km.

(a) It takes Kayla 24 minutes to walk from A to B.

Calculate her average speed in km/h.

..... km/h [2]

(b) Kayla has a map with a scale of 1 : 25 000 showing A and B.

Work out the length of AB on the map.
Give your answer in centimetres.

..... cm [2]

(b) A train is 770 m long.
The train takes 2 minutes and 36 seconds to travel completely through a tunnel.
Its speed through the tunnel is 120 km/h.

Work out the length of the tunnel.
Give your answer in metres.

..... m [4]

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Answer:

Question	Answer	Marks	Partial Marks
(a)(i)	285	**2**	**M1** for 360 – (180 – 105) oe or a sketch with correct indication of 75 or 105 at B
(a)(ii)(a)	3.75 oe	**2**	**M1** for $\frac{1.5\times[60]}{24}$
(a)(ii)(b)	6	**2**	**M1** for $\frac{1.5\times[1000\times100]}{25000}$ oe
(b)	4430	**4**	**B3** for 5200 OR **M1** for $2+\frac{36}{60}$ or $(2\times60)+36$ or $\frac{\left(2+\frac{36}{60}\right)}{60}$ **M1** for *their* $2\frac{36}{60}\times120\times[\ ]$ or *their* $((2\times60)+36)\times120\times[\ ]$ **M1** for *their* $2\frac{36}{60}\times\frac{120\times1000}{60}$ or *their* $((2\times60)+36)\times\frac{120\times1000}{60\times60}$

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14. 0607_w23_qp_42 Q: 11

(a) Simplify fully $(64x^6y^3)^{\frac{2}{3}}$.

..... [3]

(b) $3^x \times 2^x = 279\,936$

Find the value of x.

$x =$ ..... [2]

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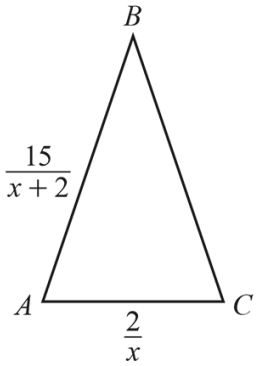
(c)



NOT TO SCALE

In triangle ABC, $AB = BC$.
The perimeter of triangle ABC is 16 cm.

(i) Show that $4x^2 - 1 = 0$.

[5]

(ii) Find the length of AB.

$AB =$ ..... cm [2]

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Answer:

Question	Answer	Marks	Partial Marks
(a)	$16x^4y^2$ final answer	**3**	**B2** for final answer kx^4y^2 or $16x^ky^2$ or $16x^4y^k$ or $\left(4x^2y\right)^2$ **B1** for 16 or x^4 or y^2 correct in 3 term final answer or **M1** for $4\times x^2\times y$ or $4096\times x^{12}\times y^6$ seen
(b)	7 nfww	**2**	**M1** for 128 or 6^x or 2187 seen OR **M1** for $x=\dfrac{\log 279936}{\log 6}$

Question	Answer	Marks	Partial Marks
(c)(i)	$\dfrac{15}{x+2}+\dfrac{15}{x+2}+\dfrac{2}{x}=16$ or $\dfrac{30}{x+2}+\dfrac{2}{x}=16$	**M1**	
	$\dfrac{30x+2(x+2)}{x(x+2)}[=16]$ or better	**M2**	**M1** for $30x+2(x+2)$ **M1** for common denominator $x(x+2)$ oe
	$30x+2x+4=16x(x+2)$	**M1**	**FT** *their* numerator with correct denominator to fraction removed
	rearranging to get to $4x^2-1=0$	**A1**	no errors or omissions
(c)(ii)	6	**2**	**M1** for $x=\dfrac{1}{2}$ or for 6 and 10 as answers

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15. 0607_w23_qp_43 Q: 1

(a) In 1911 the men's world record for the triple jump was 15.52 m.
In 2021 the record was 18.29 m.

Find 15.52 m as a percentage of 18.29 m.

..... % [1]

(b) In 2021 the women's world record for running 800 m was 1 minute 53 seconds.

Find the average speed for this run in m/s.

.....m/s [2]

(c) In 2021 the men's world record speed for running 100 m was 37.58 km/h.

Find the time taken, in seconds, for this run.

.....s [3]

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Answer:

Question	Answer	Marks	Partial Marks
(a)	84.9 or 84.85 to 84.86	**1**	
(b)	7.08 or 7.079 to 7.08	**2**	**M1** for distance divided by time. or **B1** for 113
(c)	9.58 or 9.579 to 9.580	**3**	**M1** for distance divided by speed **M1** for ÷ 1000 and × 60 × 60

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16. 0607_w23_qp_43 Q: 5

A museum records the value of a picture every 5 years.
The picture increases in value by 60% **every 5 years**.
The value the museum recorded in 2020 was $20 000.

(a) Calculate the value recorded in 2015.

$ ..... [2]

(b) Show that the value recorded in 2040 will be $131 072 .

[1]

(c) Calculate the year in which the value recorded will first be over $1 000 000.

..... [4]

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Answer:

Question	Answer	Marks	Partial Marks
(a)	12 500	**2**	**M1** for $P\left(1+\frac{60}{100}\right) = 20\,000$ oe
(b)	$20\,000 \times \left(1+\frac{60}{100}\right)^4$ oe [= 131 072]	**1**	
(c)	2065 nfww	**4**	**B3** for 9 or 8.32 or 8.323... or for 45 or 41 to 42 OR **M3** for $n\log\left(1+\frac{60}{100}\right) = \log\left(\frac{1000000}{20000}\right)$ oe or good sketch indicating value between 8 and 9 or correct trials as far as 8 and 9 or **M2** for $\left(1+\frac{60}{100}\right)^n = \frac{1000000}{20000}$ oe or sketch that could lead to solution e.g. $y = 1.6^x$ and $y = \frac{1000000}{20000}$ or at least 3 correct trials or **M1** for $20\,000 \times \left(1+\frac{60}{100}\right)^n = 1\,000\,000$ soi or at least 2 correct trials

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17. 0607_s19_qp_41 Q: 3

1 3 5 9 15 45

The list shows the six factors of 45.

This is a method for finding how many factors a number has.

- Write the number as the product of its prime factors in index form.
- Add one to each of the powers and multiply these numbers together.

For example,

$45 = 3^2 \times 5^1$

$(2+1) \times (1+1) = 3 \times 2 = 6$

So 45 has 6 factors.

(a) $24 = 2^3 \times 3^1$

By listing all the factors of 24, show that the method works for 24.

[3]

(b) Use the method to find how many factors 360 has.

..... [4]

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Answer:

Question	Answer	Marks	Partial Marks
(a)	1, 2, 3, 4, 6, 8, 12, 24	**B2**	**B1** for 7 correct and 1 incorrect or 6 or 7 correct and none incorrect or 8 correct and 1 extra
	$(3 + 1) \times (1 + 1) = 8$	**B1**	soi by $4 \times 2 = 8$

Question	Answer	Marks	Partial Marks
(b)	$360 = 2^3 \times 3^2 \times 5$	**B2**	**M1** for two steps in a factor ladder or tree oe or listing all factors of 360 with no extras or omissions.
	$(3 + 1) \times (2 + 1) \times (1 + 1)$	**M1**	soi by $4 \times 3 \times 2$ **FT** dep on factors being prime
	24	**B1**	

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18. 0607_m22_qp_42 Q: 2

(a) Find 12 kg as a percentage of 80 kg.

..... % [1]

(b) Find 19% of $250.

$ ..... [2]

(c) Xavier invests $500 at a rate of 1.5% per year simple interest.
At the end of y years, the value of Xavier's investment is $612.50 .

Find the value of y.

$y =$ ..... [3]

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(d) Each year the value of a car decreases by 12% of its value at the beginning of that year. The original value of the car is \$20 000.

(i) Calculate the value of the car at the end of 3 years. Give your answer correct to the nearest dollar.

\$ ..... [3]

(ii) Find the number of complete years for the value of \$20 000 to decrease until it is first below \$1000.

..... [4]

(e) Each year the value of another car decreases by r% of its value at the beginning of that year. At the end of 10 years, the value has decreased from \$12 000 to \$4673.

Find the value of r.

$r =$ ..... [3]

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Answer:

Question	Answer	Marks	Partial Marks
(a)	15	**1**	
(b)	47.5[0]	**2**	**M1** for $\frac{19}{100}\times 250$ oe
(c)	15	**3**	**M2** for $500+\frac{500\times 1.5\times y}{100}=612.50$ oe or **M1** for $\frac{500\times 1.5\times y}{100}$ oe or for one year's interest = 7.5[0]
(d)(i)	13629 cao	**3**	**B2** for 13630 or 13629. ... or **M1** for $20000\times\left(1-\frac{12}{100}\right)^3$ oe

Question	Answer	Marks	Partial Marks
(d)(ii)	24 nfww	**4**	**B3** for 23.4 or 23.43... OR **M3** $y\log\left(1-\frac{12}{100}\right)=\log\left(\frac{1000}{20000}\right)$ oe or correct trials reaching 23 and 24 or good sketch indicating value between 23 and 24 or **M2** for $\left(1-\frac{12}{100}\right)^y=\frac{1000}{20000}$ oe or at least 3 correct trials or suitable graph with $y > 1$ or **M1** for $20000\times\left(1-\frac{12}{100}\right)^y=1000$ oe soi by at least 2 correct trials with $n > 3$
(e)	9[.00] or 8.999 to 9.000...	**3**	**M2** for $\sqrt[10]{\frac{4673}{12000}}$ or **M1** for $12000\times(.....)^{10}=4673$

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19. 0607_s21_qp_41 Q: 6

Piero invests \$5000 in Bank A and \$5000 in Bank B.

(a) Bank A pays simple interest at a rate of 6.5% each year.

(i) Find the total amount Piero has in Bank A at the end of 4 years.

\$ ..... [3]

(ii) Find the number of complete years it takes for the total amount that Piero has in Bank A to be greater than \$10 000.

..... [3]

(b) Bank B pays compound interest at a rate of 4% each year.

(i) Find the total amount Piero has in Bank B at the end of 4 years.

\$ ..... [2]

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(ii) Find the number of complete years it takes for the total amount that Piero has in Bank B to be greater than \$10 000.

..... [4]

(c) By sketching suitable graphs, find the number of complete years it takes for the total amount that Piero has in Bank B to be greater than the total amount in Bank A.

..... [4]

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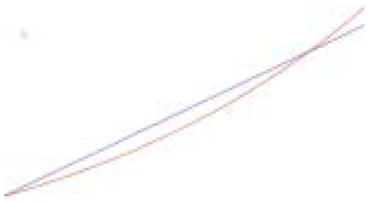
Answer:

Question	Answer	Marks	Partial Marks
(a)(i)	6300	**3**	**M2** for $5000 + 5000 \times 6.5 \times 4 \div 100$ oe or **M1** for $5000 \times 6.5 \times 4 \div 100$ oe implied by 1300

Question	Answer	Marks	Partial Marks
(a)(ii)	16	**3**	**B2** for 15.4 or 15.38... or **M2** for $\frac{5000\times100}{5000\times6.5}$ oe or **M1** for $\frac{5000\times6.5\times n}{100}$ oe
(b)(i)	5849.29 or 5850	**2**	**M1** for $5000\times\left(1+\frac{4}{100}\right)^4$ oe
(b)(ii)	18	**4**	**B3** for 17.7 or 17.67… as answer or **M3** for $\log\frac{10000}{5000}=n\log\left(1+\frac{4}{100}\right)$ oe or correct trials including 17 and 18 or good sketch indicating value between 17 and 18 or **M2** for $\frac{10000}{5000}=\left(1+\frac{4}{100}\right)^n$ oe or at least 3 correct trials with $n > 4$ or sketch that could lead to solution or **M1** for $10000=5000\times\left(1+\frac{4}{100}\right)$ oe or at least 2 trials with $n > 4$ or suitable graph
(c)	Correct sketch 	**M3**	**M2** for suitable graphs, e.g. $y = 1.4^x$ and $y = 1 + 0.065x$ or **M1** for one suitable graph, e.g. $y = 1.04x$ or $y = 1 + 0.0656x$
	24	**B1**	

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20. 0607_s21_qp_42 Q: 1

Ernst makes chairs.

(a) The total cost of making a chair is \$250.

Total cost = cost of materials + \$26 for each hour worked

Ernst works for $6\frac{1}{2}$ hours to make a chair.

Calculate the cost of the materials as a percentage of the total cost of \$250.

..... % [3]

(b) Ernst sells the chairs to a shop.
The shop makes 24% profit when they sell a chair for \$396.80 .

Calculate the amount the shop pays Ernst for a chair.

\$ ..... [2]

(c) In a sale the shop reduces the price, \$396.80, of each chair by 3% each day until it is sold.

Find the number of days until the price first goes below \$200.

..... [4]

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Answer:

Question	Answer	Marks	Partial Marks
(a)	32.4	**3**	**M2** for $\frac{250-6.5\times26}{250}[\times100]$ oe or $\frac{6.5\times26}{250}\times100$ or **M1** for $250 - 6.5 \times 26$ soi by 81 or $\frac{6.5\times26}{250}$
(b)	320	**2**	**M1** for $(\ldots)\times\left(1+\frac{24}{100}\right)=396.8$ or better
(c)	23	**4**	**B3** for 22.49… or 22.5 or 22 as answer or **M3** for $n\log\left(1-\frac{3}{100}\right)=\log\left(\frac{200}{396.8}\right)$ oe or correct trials as far as 22 and 23 or sketch indicating value between 22 and 23 or **M2** for $\left(1-\frac{3}{100}\right)^n=\frac{200}{396.8}$ oe or at least 3 correct trials or a sketch that could lead to solution e.g. $y=0.97^x$ and $y=200$ or **M1** for $396.8\times\left(1-\frac{3}{100}\right)^n=200$ soi. or at least 2 correct trials

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21. 0607_s21_qp_43 Q: 2

(a) Increase \$55 by 250%.

\$ ..... [2]

(b) (i) Beatrice invests \$500 at a rate of 1.5% per year simple interest.

Find the amount Beatrice has at the end of 12 years.

\$ ..... [3]

(ii) Dan invests \$500 at a rate of 1.5% per year compound interest.

Find the difference between Dan's amount and Beatrice's amount at the end of 12 years.

\$ ..... [3]

(c) Eva invests an amount of money at a rate of 2.1% per year compound interest.

Find the number of complete years it takes for Eva's investment to double in value.

..... [4]

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(d) Each year the value of Fred's car reduces by 15% of its value at the start of that year. The value of the car is now \$5158.65 .

Find the value of Fred's car 3 years ago.

\$ ..... [3]

Answer:

Question	Answer	Marks	Partial Marks
(a)	192.5[0]	**2**	**M1** for $55 \times \frac{250}{100}$ oe or better
(b)(i)	590	**3**	**M2** for $500 + \frac{500\times1.5\times12}{100}$ oe or **M1** for $\frac{500\times1.5\times12}{100}$
(b)(ii)	7.81	**3**	**B2** for 597.8..... or 598 seen OR **M2** for $500\left(1+\frac{1.5}{100}\right)^{12}$ − *their* (b)(i) oe or **M1** for $500\left(1+\frac{1.5}{100}\right)^{12}$ oe

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Question	Answer	Marks	Partial Marks
(c)	34	**4**	**B3** for 33.4 or 33.35... OR **M3** for $n\log\left(1+\frac{2.1}{100}\right)=\log 2$ oe or for trials reaching 33 and 34 or good sketch indicating value between 33 and 34 or **M2** for $\left(1+\frac{2.1}{100}\right)^n=2$ oe or for at least 3 correct trials or for suitable graph or **M1** for $\left(1+\frac{2.1}{100}\right)^n$ oe soi by two trials For M2 and M1 oe includes use of a sum of money
(d)	8400	**3**	**M2** for $5158.65\div\left(\frac{100-15}{100}\right)^3$ oe or **M1** for $5158.65\div\left(\frac{100-15}{100}\right)^n$, including $n = 1$

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22. 0607_w21_qp_41 Q: 1

Amir, Bibi and Caitlyn are each given \$1500 to invest.

(a) Amir invests his \$1500 in an account which pays compound interest.
The interest rate is 3% per year for 5 years, after which it is 2% per year.

Find the value of Amir's investment at the end of 11 years.

\$ ..... [3]

(b) Bibi invests her \$1500 in an account which pays r% per year **simple** interest.
At the end of 11 years, the investment is worth \$1962.

Calculate the value of r.

$r =$ ..... [3]

(c) Caitlyn invests her \$1500 in an account which pays t% per year **compound** interest.
At the end of 11 years, the investment is worth \$1968.13 .

Calculate the value of t.

$t =$ ..... [3]

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Answer:

Question	Answer	Marks	Partial Marks
(a)	1958.3[0]	**3**	**M2** $1500\left(1+\frac{3}{100}\right)^5\left(1+\frac{2}{100}\right)^6$ oe or **M1** for $\left(1+\frac{3}{100}\right)^5$ or $\left(1+\frac{2}{100}\right)^6$ oe seen
(b)	2.8	**3**	**M2** for $\frac{(1962-1500)}{1500\times 11}[\times 100]$ oe or $\left(\frac{1962}{1500}\times 100\right)-100$ oe or **M1** for $[1500+]\ \frac{1500\times r\times 11}{100}$ or $\frac{1962}{1500}\times 100$
(c)	2.5	**3**	**M2** for $\sqrt[11]{\frac{1968.13}{1500}}$ oe **M1** for $1500(k)^{11} = 1968.13$

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23. 0607_w21_qp_42 Q: 1

(a) Stella and Tomas share \$200 in the ratio 11 : 14.

(i) Show that Stella receives \$88.

[1]

(ii) Stella invests her \$88 at a rate of 1.5% per year simple interest.

Calculate the amount of interest Stella has at the end of 6 years.

\$ ..... [2]

(b) Urs buys some clothes in a sale.

(i) He buys a jacket for \$22.
The original price of the jacket was \$25.

Calculate the percentage reduction in the price of the jacket.

..... % [3]

(ii) Urs buys a shirt for \$13.50 .
This is the price after a reduction of 10% of the original price.

Calculate the original price of the shirt.

\$ ..... [2]

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Answer:

Question	Answer	Marks	Partial Marks
(a)(i)	$\frac{11}{11+14}\times 200$ or $\frac{11}{25}\times 200$ oe	**M1**	
(a)(ii)	7.92	**2**	**M1** for $\frac{88\times 1.5\times 6}{100}$ oe
(b)(i)	12	**3**	**M2** for $\frac{25-22}{25}$ oe or $\frac{22}{25}\times 100$ oe or **M1** for $\frac{22}{25}$
(b)(ii)	15	**2**	**M1** for $\frac{100-10}{100}\times[...]=13.50$ oe

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24. 0607_w21_qp_43 Q: 5

(a) Alana and Beau share \$200 in the ratio $x : y$.

An expression for the amount of money Alana receives is $\frac{200x}{x+y}$.

(i) Write down an expression for the amount of money Beau receives.

..... [1]

(ii) Alana and Beau are each given an extra \$50.
The ratio of the total amount of money that each person now has is $3 : 1$.

Find the value of $\frac{x}{y}$.

$\frac{x}{y} =$ ..... [5]

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(b) (i) On 1 January **each year** Bruno invests \$1000 in Bank A.
Bank A pays simple interest at a rate of 4% per year.

Show that the total value of Bruno's investment in Bank A at the end of 4 years is \$4400.

[3]

(ii) On 1 January **each year** Bruno also invests \$1000 in Bank B.
Bank B pays compound interest at a rate of 3.5% per year.

Find the total value of Bruno's investment in Bank B at the end of 4 years.

\$ ..... [3]

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Answer:

Question	Answer	Marks	Partial Marks
(a)(i)	$\frac{200y}{x+y}$ or $200-\frac{200x}{x+y}$	**1**	
(a)(ii)	7	**5**	**M4** for $250x+50y=3(50x+250y)$ oe or **M3** for $\frac{250x+50y}{50x+250y}=3$ oe or **M2** for $250x+50y$ or $250y+50x$ oe or **B1** for $\frac{200x}{x+y}+50$ or $\frac{200y}{x+y}+50$ OR **M4** for $x:y=175:25$ oe or **M3** for $225-50$ or $75-50$ oe or **M2** for $\frac{200+100}{3+1}$ oe or **B1** for $200+100$
(b)(i)	$\frac{1000\times4\times(4+3+2+1)}{100}$ [= 400] oe	**M2**	**M1** for $1000\times\frac{4}{100}$ oe or better
	4000 + 400 [= 4400]	**A1**	
(b)(ii)	4362.47	**3**	**M2** for $1000\times(1.035+1.035^2+1.035^3+1.035^4)$ oe or **M1** for 1000×1.035 oe

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