Contents

Chapter 1

Numbers (C1)

1.1 Integers, factors, multiples, prime numbers

1. 0580_S13_QP_33 Q: 2

(a)

2	$\sqrt{12}$	144	40	$\sqrt{6.25}$	110	11	4	80	0.25

From this list of numbers, write down

(i) a two-digit odd number,

Answer(a)(i) ..... [1]

(ii) a square number,

Answer(a)(ii) ..... [1]

(iii) the value of 2^{-2},

Answer(a)(iii) ..... [1]

(iv) an irrational number,

Answer(a)(iv) ..... [1]

(v) the lowest common multiple of 8 and 10,

Answer(a)(v) ..... [2]

(vi) the cube root of 8.

Answer(a)(vi) ..... [1]

(b) (i) Find the smallest factor, apart from 1, of 2013.

Answer(b)(i) ..... [1]

(ii) Write 2013 as the product of its prime factors.

Answer(b)(ii) ..... × ..... × ..... [2]

1.2 Venn diagram, sets

2. 0580_M20_QP_32 Q: 9

(a) $\mathscr{E} = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14\}$
$F = \{x: x \text{ is a factor of } 14\}$
$P = \{x: x \text{ is a prime number less than } 14\}$

Only section (a) is related to this syllabus item (1.2)

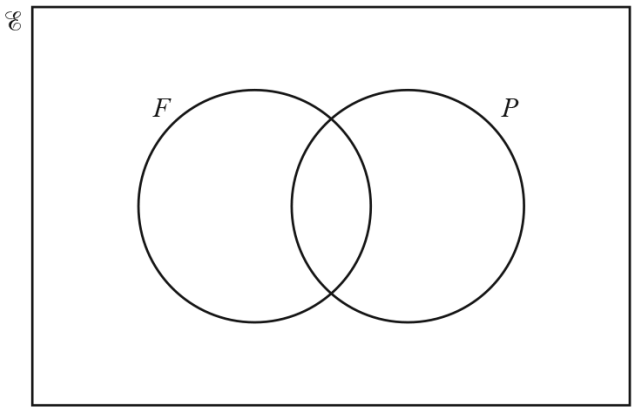
(i) Write down the elements in set F.

$F = \{$ ..... $\}$ [2]

(ii) Write down the elements in set P.

$P = \{$ ..... $\}$ [2]

(iii)



(a) Complete the Venn diagram.

[2]

(b) Write down $\mathrm{n}(F \cap P)$.

..... [1]

(c) A number is chosen at random from the universal set $\mathscr{E}$.

Write down the probability that the number is in the set $F \cup P$.

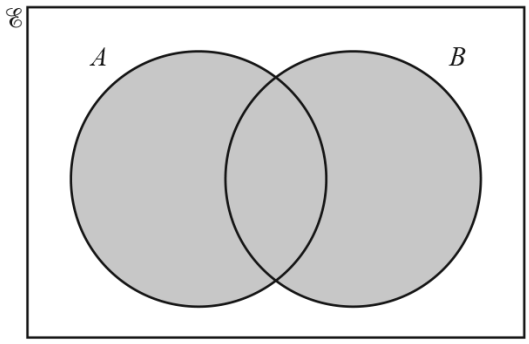
..... [2]

(b) Write 195 as a product of its prime factors.

..... [2]

3. 0580_S20_QP_31 Q: 9

(a) Use set notation to describe the shaded region in each Venn diagram.



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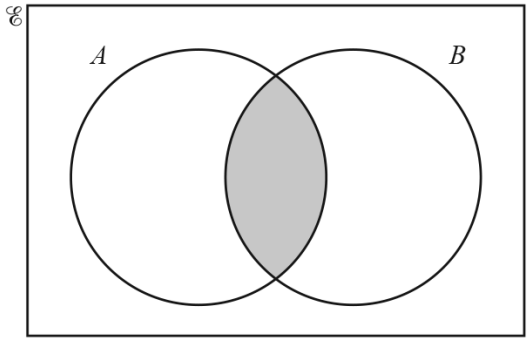
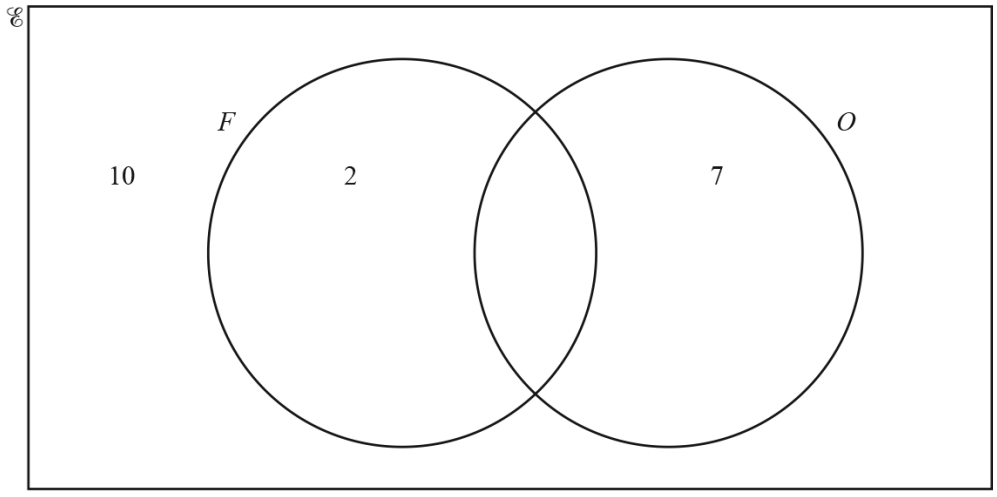


.....

[2]

(b) $\mathscr{E} = \{x : x \text{ is a natural number} \leqslant 15\}$
$F = \{x : x \text{ is a factor of } 12\}$
$O = \{x : x \text{ is an odd number}\}$

(i) Complete the Venn diagram to show the elements of these sets.



[2]

(ii) Write down one number that is in set O, but not in set F.

..... [1]

(iii) Find $\mathrm{n}(F \cup O)$.

..... [1]

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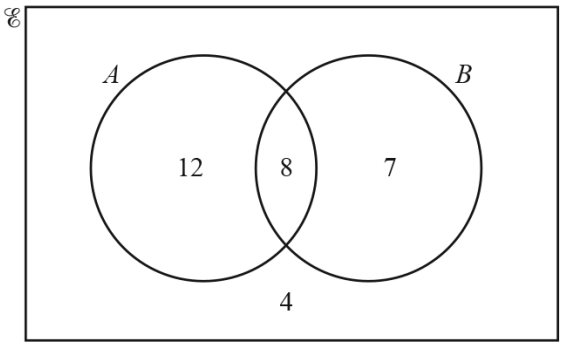
4. 0580_S20_QP_33 Q: 5

(a) The Venn diagram shows information about the number of students in a class who like apples (A) and bananas (B).



(i) Work out the number of students in the class.

..... [1]

(ii) Work out the number of students who like bananas.

..... [1]

(iii) Work out $\mathrm{n}(A \cup B)$.

..... [1]

(iv) How many more students like apples than like bananas?

..... [1]

(b) The mass, m grams, of a banana is 115 g, correct to the nearest 5 g.

Complete the statement about the value of m.

..... $\leqslant m <$ ..... [2]

(c) Six of the students bring an apple to school one day.
The list shows the mass of each apple, correct to the nearest gram.

82 94 78 103 88 82

(i) Find

(a) the mode,

..... g [1]

(b) the range,

..... g [1]

(c) the median.

..... g [2]

(ii) Another student, Toni, also brings an apple to school.
The mean mass of the 7 apples is 89 g.

Work out the mass of Toni's apple.

..... g [3]

1.3 Squares, cubes, roots

5. 0580_M18_QP_32 Q: 5

(a) Write down

(i) the number 604 925 in words,

.....

..... [1]

(ii) a prime number between 50 and 60,

..... [1]

(iii) the value of 999^0.

..... [1]

(b) Find

(i) the smallest multiple of 7 that is greater than 100,

..... [1]

(ii) the largest cube number that is less than 100,

..... [1]

(iii) the six factors of 45,

..... , ... , ... , ... , ... , ... [2]

(iv) an irrational number between 6 and 7.

..... [1]

6. 0580_S17_QP_32 Q: 4

(a)

4 10 11 18 20 27 28 32 36 40 56

From the list above, write down

(i) a multiple of 12,

..... [1]

(ii) a factor of 8,

..... [1]

(iii) a prime number,

..... [1]

(iv) a square number,

..... [1]

(v) a cube number.

..... [1]

(b) Find the lowest common multiple (LCM) of 32 and 80.

..... [2]

(c) Find the value of

(i) $\sqrt{68.89}$,

..... [1]

(ii) $\sqrt[3]{19\,683}$.

..... [1]

7. 0580_S12_QP_32 Q: 3

(a) Calculate

(i) 3^3,

Answer(a)(i) ..... [1]

(ii) $\frac{12^2}{\sqrt{81}}$,

Answer(a)(ii) ..... [1]

(iii) the cube root of 4913.

Answer(a)(iii) ..... [1]

(b) Find

(i) all the square numbers between 6 and 40,

Answer(b)(i) ..... [2]

(ii) four factors of 76,

Answer(b)(ii) ..... [2]

(iii) a prime factor of 35,

Answer(b)(iii) ..... [1]

(iv) the lowest common multiple of 6 and 8,

Answer(b)(iv) ..... [2]

(v) the highest common factor of 56 and 70.

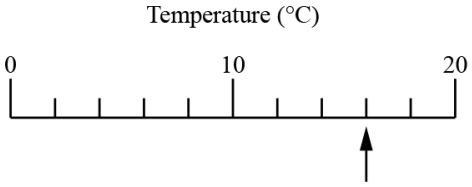
Answer(b)(v) ..... [2]

1.4 Directed numbers

8. 0580_W17_QP_31 Q: 1

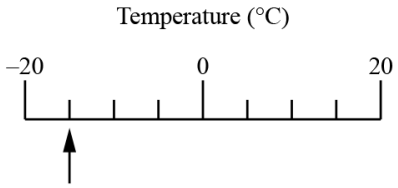
(a) Write down the temperature shown by each arrow.

(i)



..... °C [1]

(ii)



..... °C [1]

(b) The table shows the daily temperature in Hayville for one week in January.

Day	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Temperature (°C)	–4	2	–1	0	1	–6	–2

(i) Which was the coldest day?

..... [1]

(ii) Find the difference between the temperature on Sunday and the temperature on Monday.

..... °C [1]

(c) In Grassington, the temperature recorded at 0735 was −3 °C.

(i) The temperature was recorded again $8\frac{1}{2}$ hours later.

At what time was this temperature recorded?

..... [1]

(ii) By this time, the temperature had risen by 7 °C.

Find this temperature.

..... °C [1]

1.5 Fractions, percentages, equivalence, vulgar, decimal

9. 0580_S16_QP_31 Q: 2

(a) 3 6 19 20 24 27 30 32 35 36 48 49 51

From this list of numbers write down

(i) a factor of 15,

..... [1]

(ii) a multiple of 18,

..... [1]

(iii) an odd square number,

..... [1]

(iv) a cube number.

..... [1]

(b) Write as a percentage.

(i) 0.43

.....% [1]

(ii) $\frac{1}{2}$

.....% [1]

(c) Write $\frac{28}{42}$ in its lowest terms.

..... [1]

(d) **(i)** Write 45 as a product of its prime factors.

..... [2]

(ii) Find the highest common factor (HCF) of 45 and 105.

..... [2]

1.6 Order quantities, magnitude

10. 0580_S15_QP_32 Q: 1

(a) 4 3 0 2 9 5 7

From the list above, write down

(i) the factors of 24,

Answer(a)(i) ..... [1]

(ii) a prime factor of 24,

Answer(a)(ii) ..... [1]

(iii) the highest common factor (HCF) of 56 and 91,

Answer(a)(iii) ..... [1]

(iv) the square root of 49,

Answer(a)(iv) ..... [1]

(v) the cube root of 27.

Answer(a)(v) ..... [1]

(b) **(i)** Using four numbers from the list in **part (a)**, form the largest 4-digit number.

Answer(b)(i) ..... [1]

(ii) Write your answer to **part (b)(i)** in words.

Answer(b)(ii) .....

..... [1]

(c) Find

(i) the common multiple of 5 and 8 between 100 and 150,

Answer(c)(i) ..... [1]

(ii) the square number between 350 and 390.

Answer(c)(ii) ..... [1]

11. 0580_W13_QP_31 Q: 2

(a) **(i)** 1 and 120 are factors of 120.

Write down another factor of 120.

Answer(a)(i) ..... [1]

(ii) Find the highest common factor of 120 and 900.

Answer(a)(ii) ..... [2]

(b) 2 5 15 24 49 60 258 512

From the list, write down

(i) a multiple of 30,

Answer(b)(i) ..... [1]

(ii) a square number,

Answer(b)(ii) ..... [1]

(iii) the cube root of 8.

Answer(b)(iii) ..... [1]

(c) Give an example to show that the following statements are **not** true.

(i) An odd number multiplied by an even number gives an odd number.

Answer(c)(i) ..... [1]

(ii) The cube of a negative number is positive.

Answer(c)(ii) ..... [1]

(d) Use $<$, $>$, or $=$ to complete the following statements.
Each symbol may be used more than once.

(i) 0.5 ..... $\frac{3}{8}$ [1]

(ii) 1.5 ..... 105% [1]

(iii) 0.78 ..... $\frac{11}{14}$ [1]

12. 0580_W12_QP_31 Q: 1

(a) **(i)** Write down two numbers that are multiples of 10.

Answer(a)(i) ..... and ..... [1]

(ii) Find the lowest common multiple of 10 and 15.

Answer(a)(ii) ..... [2]

(b) 4 6 9 15 23 27 32 36

From the list above, write down

(i) a factor of 18,

Answer(b)(i) ..... [1]

(ii) a cube number,

Answer(b)(ii) ..... [1]

(iii) a prime number.

Answer(b)(iii) ..... [1]

(c) Give an example to show that each of these statements is **not** true.

(i) All square numbers are even.

Answer(c)(i) ..... [1]

(ii) When two prime numbers are added the answer is always even.

Answer(c)(ii) ..... [1]

(d) Write the following in order of size, starting with the smallest.

2^5 8^0 4^{-2} $\sqrt{169}$

Answer(d) ..... < ..... < ..... < ..... [2]

1.7 Fractional, indices, standard form

13. 0580_W17_QP_31 Q: 6

(a) Find

(i) all the factors of 18,

..... [2]

(ii) a multiple of 30,

..... [1]

(iii) $\sqrt{2134.44}$,

..... [1]

(iv) 2.5^3,

..... [1]

(v) $(0.2)^{-1}$.

..... [1]

(b) Write 72 as a product of its prime factors.

..... [2]

(c) Find the lowest common multiple (LCM) of 16 and 30.

..... [2]

(d) Clock A chimes every 6 hours.
Clock B chimes every 9 hours.
Both clocks chime at 2 am.

At what time will the two clocks next chime together?

..... [3]

14. 0580_W17_QP_32 Q: 2

(a) Write the number 8045 in words.

..... [1]

(b) Write down a number between 60 and 70 that is

(i) a square number,

..... [1]

(ii) a prime number,

..... [1]

(iii) a common multiple of 4 and 17.

..... [1]

(c) **(i)** Write 98 as a product of its prime factors.

..... [2]

(ii) Find the highest common factor (HCF) of 98 and 182.

..... [2]

(d) Find the value of

(i) 6^4,

..... [1]

(ii) $\sqrt[3]{24\,389}$,

..... [1]

(iii) 14^1,

..... [1]

(iv) 5^{-3}.

..... [1]

15. 0580_W15_QP_31 Q: 2

(a) Write down a number between 20 and 30 that is

(i) a multiple of 6,

Answer(a)(i) ..... [1]

(ii) a square number,

Answer(a)(ii) ..... [1]

(iii) a cube number,

Answer(a)(iii) ..... [1]

(iv) a prime number.

Answer(a)(iv) ..... [1]

(b) Find

(i) $\sqrt[3]{4913}$,

Answer(b)(i) ..... [1]

(ii) 3^5,

Answer(b)(ii) ..... [1]

(iii) 6^0,

Answer(b)(iii) ..... [1]

(iv) 2^{-4}.

Answer(b)(iv) ..... [1]

(c) **(i)** Write 84 as a product of its prime factors.

Answer(c)(i) ..... [2]

(ii) Find the highest common factor (HCF) of 84 and 126.

Answer(c)(ii) ..... [2]

Appendix A

Answers

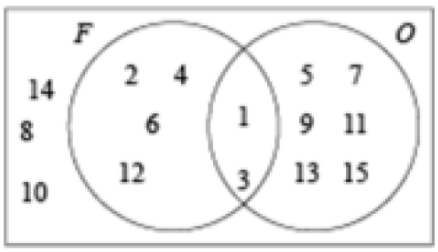
1. 0580_S13_MS_33 Q: 2

	Answer	Mark	Partial Marks
(a) (i)	11	1	
(ii)	144 or 4 or 0.25	1	
(iii)	0.25	1	
(iv)	$\sqrt{12}$	1	
(v)	40 cao	2	B1 for 80 or any common multiple of 40
(vi)	2	1	
(b) (i)	3	1	
(ii)	3 [×] 11 [×] 61	2	B1 for two of 3, 11 and 61 seen

2. 0580_M20_MS_32 Q: 9

	Answer	Mark	Partial Marks
(a)(i)	1, 2, 7, 14	**2**	**B1** for 3 correct and one omission or for 4 correct and one extra
(a)(ii)	2, 3, 5, 7, 11, 13	**2**	**B1** for 5 correct and one omission or for 6 correct and one extra
(a)(iii)(a)	1, 14 2, 7 3, 5, 11, 13 4, 6, 8, 9, 10, 12	**2**	**FT** *their* **(a)(i)** and *their* **(a)(ii)** **B1FT** for two or three sections correct
(a)(iii)(b)	2	**1**	**FT** from *their* diagram
(a)(iii)(c)	$\frac{4}{7}$ oe	**2**	**FT** from *their* diagram for the numerator **B1** for $\frac{k}{14}$, $k \leqslant 14$
(b)	$3 \times 5 \times 13$	**2**	**B1** for 3, 5, 13 or 65×3 or 39×5 or 15×13

3. 0580_S20_MS_31 Q: 9

	Answer	Mark	Partial Marks
(a)	$A \cup B$ $A \cap B$	**2**	**B1** for each
(b)(i)		**2**	**B1** for 2 or 3 correctly completed regions
(b)(ii)	One of 5, 7, 9, 11, 13, 15	**1**	**FT** *their* Venn diagram
(b)(iii)	12	**1**	**FT** *their* Venn diagram
(b)(iv)	$\frac{8}{15}$ oe	**1**	**FT** *their* Venn diagram

4. 0580_S20_MS_33 Q: 5

	Answer	Mark	Partial Marks
(a)(i)	31	**1**	
(a)(ii)	15	**1**	
(a)(iii)	27	**1**	
(a)(iv)	5	**1**	
(a)(v)	$\frac{4}{31}$ oe	**1**	**FT** $\frac{4}{\textit{their}\ \textbf{(a)(i)}}$
(b)	112.5 117.5	**2**	**B1** for each If 0 scored, **SC1** for both correct but reversed
(c)(i)(a)	82	**1**	
(c)(i)(b)	25	**1**	
(c)(i)(c)	85	**2**	**M1** for 78, 82, 82, 88, 94, 103 or for first 4 or last 4 numbers seen in order with no errors or for 82 and 88 both selected
(c)(ii)	96	**3**	**M2** for $7 \times 89 - (82 + 94 + 78 + 103 + 88 + 82)$ or for $7 \times 89 = 527 + x$ or **M1** for 7×89 or for $89 =$ $(82 + 94 + 78 + 103 + 88 + 82 + x) \div 7$ or **B1** for 527

5. 0580_M18_MS_32 Q: 5

	Answer	Mark	Partial Marks
(a)(i)	Six hundred (and) four thousand, nine hundred (and) twenty five	**1**	Condone Six lakh (and) four thousand, nine hundred (and) twenty five
(a)(ii)	53 or 59	**1**	
(a)(iii)	1	**1**	
(b)(i)	105	**1**	
(b)(ii)	64	**1**	
(b)(iii)	1, 3, 5, 9, 15, 45	**2**	**B1** for 4 or 5 correct factors
(b)(iv)	Any irrational number between 6 and 7 e.g. $\sqrt{37}$ or 2π	**1**	

6. 0580_S17_MS_32 Q: 4

	ANSWER	MARK	PARTIAL MARKS
(a)(i)	36	**1**	
(a)(ii)	4	**1**	
(a)(iii)	11	**1**	
(a)(iv)	36 or 4 or both	**1**	
(a)(v)	27	**1**	
(b)	160 cao	**2**	**M1** for any common multiple 160 n or any product that equals 160 or two lists of correct multiples of each number or either number correctly reduced to its prime factors
(c)(i)	8.3	**1**	
(c)(ii)	27	**1**	

7. 0580_S12_MS_32 Q: 3

	Answer	Mark	Partial Marks
(a) (i)	27	**1**	
(ii)	16	**1**	
(iii)	17	**1**	
(b) (i)	9, 16, 25, 36	**2**	**B1** for 3 correct or either 3 or 4 correct with other values, or all of 3^2, 4^2, 5^2, 6^2
(ii)	4 from 1, 2, 4, 19, 38, 76	**2**	**B1** if 3 correct none wrong or 4 correct and 1 wrong or 5 correct and 1 wrong or 6 correct and 1 wrong
(iii)	5 or 7	**1**	
(iv)	24	**2**	**B1** for any other multiple of 24
(v)	14	**2**	**B1** for answer of 7 or 2×7

8. 0580_W17_MS_31 Q: 1

	ANSWER	MARK	PARTIAL MARKS
(a)(i)	16	**1**	
(a)(ii)	–15	**1**	
(b)(i)	Friday	**1**	
(b)(ii)	6	**1**	
(c)(i)	1605 or 405 pm	**1**	
(c)(ii)	4	**1**	

9. 0580_S16_MS_31 Q: 2

	ANSWER	MARK	PARTIAL MARKS
(a) (i)	3	**1**	
(ii)	36	**1**	
(iii)	49	**1**	
(iv)	27	**1**	
(b) (i)	43	**1**	
(ii)	50	**1**	
(c)	$\frac{2}{3}$	**1**	
(d) (i)	$3^2 \times 5$ or $3 \times 3 \times 5$	**2**	**B1** for 3 and 5 only identified as factors or for a correct product e.g. 9×5 or 3×15
(ii)	15	**2**	**M1** for $3 \times 5 \times 7$ [= 105] or **B1** for 3 or 5 as final answer

10. 0580_S15_MS_32 Q: 1

	ANSWER	MARK	PARTIAL MARKS
(a) (i)	2, 3, 4	**1**	
(ii)	2 or 3	**1**	
(iii)	7	**1**	
(iv)	7	**1**	
(v)	3	**1**	
(b) (i)	9754	**1**	
(ii)	Nine thousand seven hundred [and] fifty four	**1FT**	**FT** *their* **(b)(i)** provided it has at least four figures
(c) (i)	120	**1**	
(ii)	361	**1**	

11. 0580_W13_MS_31 Q: 2

	Answer	Mark	Partial Marks
(a) (i)	2, 3, 4, 5, 6, 8, 10, 12, 15, 20, 24, 30, 40, 60.	**1**	Award mark for any one from list.
(ii)	60	**2**	**B1** for any common factor on answer line, 1, 2, 3, 4, 5, 6, 10, 12, 15, 20, 30
(b) (i)	60	**1**	
(ii)	49	**1**	
(iii)	2	**1**	
(c) (i)	Any correct example	**1**	Calculation and correct answer must be seen
(ii)	Any correct example	**1**	Calculation and correct answer must be seen
(d) (i)	>	**1**	
(ii)	>	**1**	
(iii)	<	**1**	

12. 0580_W12_MS_31 Q: 1

	Answer	Mark	Partial Marks
	(a) (i) Any two multiples of 10	**1**	
	(ii) 30	**2**	**B1** for any other common multiple of 10 and 15 ie 30*k*
	(b) (i) 6 or 9 or 6 and 9 cao	**1**	
	(ii) 27 cao	**1**	
	(iii) 23 cao	**1**	
	(c) (i) Example of odd square number	**1**	
	(ii) Example of odd sum of primes	**1**	
	(d) 4^{-2}, 8^{0}, $\sqrt{169}$, 2^{5}	**2**	**B1** for only 1 out of order or for three seen correctly evaluated

13. 0580_W17_MS_31 Q: 6

	ANSWER	MARK	PARTIAL MARKS
(a)(i)	1, 2, 3, 6, 9, 18 only	**2**	**B1** for 4 or 5 correct factors and no extras or 6 correct with one extra
(a)(ii)	Any multiple of 30	**1**	
(a)(iii)	46.2	**1**	
(a)(iv)	15.625	**1**	
(a)(v)	5	**1**	
(b)	$2^3 \times 3^2$	**2**	**M1** for a complete factor tree or 2, 2, 2, 3, 3 clearly identified as factors
(c)	240	**2**	**M1** for [16=] 2^4 or $2 \times 2 \times 2 \times 2(\times 1)$ or [30=] $2 \times 3 \times 5(\times 1)$ or lists of multiples of both at least up to 240, or any product that equals 240 or **B1** for 240*n*
(d)	20 00 or 8 pm	**3**	**M1** for [LCM of 6 and 9 =] 18(00) or **M1** for lists of multiples **B1FT** for "2 am" + *their* 18 correctly worked out soi OR **B2** for [clock A = 2] 8, 14, 20… and [clock B = 2] 11, 20…. or **B1** for [clock A = 2] 8, 14, 20…or [clock B = 2] 11, 20…

14. 0580_W17_MS_32 Q: 2

	ANSWER	MARK	PARTIAL MARKS
(a)	Eight thousand [and] forty-five	**1**	
(b)(i)	64	**1**	
(b)(ii)	61 or 67	**1**	
(b)(iii)	68	**1**	
(c)(i)	2×7^2 or $2 \times 7 \times 7$	**2**	**M1** for 2, 7, 7 or 2, 7^2 or $1 \times 2 \times 7 \times 7$ or $1 \times 2 \times 7^2$
(c)(ii)	14	**2**	**M1** for (182 =) $2 \times 7 \times 13$ or 2, 7, 13 or **B1** for 2 or 7 or 2×7 as final answer
(d)(i)	1296	**1**	
(d)(ii)	29	**1**	
(d)(iii)	14	**1**	
(d)(iv)	0.008 or $\frac{1}{125}$	**1**	

15. 0580_W15_MS_31 Q: 2

	ANSWER	MARK	PARTIAL MARKS
(a) (i)	24 or 30	**1**	
(ii)	25	**1**	
(iii)	27	**1**	
(iv)	23 or 29	**1**	
(b) (i)	17	**1**	
(ii)	243	**1**	
(iii)	1	**1**	
(iv)	0.0625 or $\frac{1}{16}$	**1**	
(c) (i)	$2^2 \times 3 \times 7$ or $2 \times 2 \times 3 \times 7$	**2**	**B1** for 2, 2, 3, 7
(ii)	42	**2**	**B1** for $2 \times 3 \times 7$ or 2 or 3 or 6 or 7 or 14 or 21 as answer or [126 =] $2 \times 3^2 \times 7$ or $2 \times 3 \times 3 \times 7$

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	Answer	Mark	Partial Marks
(a) (i)	1, 2, 11, 22	2	**B1** for just three of these or 3 correct with 1 extra or all four and up to 2 extras or 1×22 and 2×11
(ii)	39	1	
(b) (i)	2,17,19	2	**B1** for just two of these or all three and an extra one
(ii)	1 or 27	1	
(c) (i)	3.5×10^{-3}	1	
(ii)	4.2×10^4	2	**M1** for 42 000 oe