Q1. Find the Lowest Common Multiple (LCM) of 20 and 36.

.....

(Total 2 marks)

Q2. Find the Lowest Common Multiple (LCM) of 8 and 12.

.....

(Total 2 marks)

Q3. Veena bought some food for a barbecue.
She is going to make some hot dogs.
She needs a bread roll and a sausage for each hot dog.

There are 40 bread rolls in a pack.
There are 24 sausages in a pack.

Veena bought exactly the same number of bread rolls and sausages.

(i) How many packs of bread rolls and packs of sausages did she buy?

..... packs of bread rolls

..... packs of sausages

(ii) How many hot dogs can she make?

..... hot dogs

(Total 5 marks)

Q4. (a) Express 84 as a product of its prime factors.

.....

(2)

Sally is a patient in a hospital.
She has to take a red pill every 4 hours, a blue pill every 6 hours and a white pill every 8 hours.
She takes a pill of each colour at midday.

(b) When will she next take a pill of each colour at the same time?

.....

(2)
(Total 4 marks)

Q5. (a) Express 252 as a product of its prime factors.

.....

(3)

James thinks of two numbers.
He says "The Highest Common Factor (HCF) of my two numbers is 3
The Lowest Common Multiple (LCM) of my two numbers is 45"

(b) Write down two numbers that James could be thinking of.

..... and .....

(3)
(Total 6 marks)

Q6. Express 252 as a product of its prime factors.

.....

(Total 3 marks)

Q7. (a) Express 84 as a product of its prime factors.

.....

(3)

(b) Find the Highest Common Factor (HCF) of 84 and 35

.....

(2)
(Total 5 marks)

Q8. Find the Lowest Common Multiple (LCM) of 24 and 36

.....

(Total 2 marks)

Q9. $2x^2 = 72$

(a) Find a value of x.

.....

(2)

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

.....

(2)
(Total 4 marks)

Q10. (a) Express 66 as a product of its prime factors.

.....

(2)

(b) Express 132^2 as a product of its prime factors.

.....

(2)
(Total 4 marks)

M1.

Working	Answer	Mark	Additional Guidance
20, 40, 60, ..., 180, ... 36, 72, 108, ..., 180, ...	180	2	**M1** for 20, 40, 60... and 36, 72, 108, ... **A1** for 180 cao Alternative: **M1** for 2 × 2 × 5 and 2 × 2 × 3 × 3 **A1** for 180 cao
			Total for Question: 2 marks

M2.

Answer	Mark	Additional Guidance
24	2	**M1** for list of at least 3 multiples of 8 **and** 2 multiples of 12 **or** correct method to write **either** 8 **or** 12 as product of prime factors **A1** cao
		Total for Question: 2 marks

M3.

Working	Answer	Mark	Additional Guidance
LCM (40, 24) = 120	Rolls (packs) 3	5	**M1** attempts multiples of either 40 or

Rolls 120 ÷ 40 = Sausages 120 ÷ 24 = OR Rolls 40 is 2 × 2 × 2 (× 5) Sausages 24 is 2 × 2 × 2 (× 3) 40, 80, **120**, 160, 200, 240, 280 24, 48, 72, 96, **120**, 144, 168	Sausages (trays) 5 Hot dogs 120		24 (at least 3 but condone errors if intention is clear) **M1** attempts multiples of both 40 and 24 (at least 3 of each but condone errors if intention is clear) **M1** (dep on **M1**) division by 40 or 24 or counts up multiples. (implied if one answer correct or answers reversed) **A1** rolls (packs) 3, sausages (trays) 5 OR any multiple of 3,5 **A1** hot dogs 120 or ft on both of their packs or ft 'common multiple' OR **M1** expansion of either number into factors **M1** demonstrates one of the expansions that includes 8 oe **M1** demonstrates a 2nd expansion that includes 8 oe **A1** cao for rolls (packs) 3, sausages (trays) 5 **A1** hot dogs 120
			Total for Question: 5 marks

M4.

	Working	Answer	Mark	Additional Guidance
(a)	84 = 2 × 42 = 2 × 2 × 21 = 2 × 2 × 3 × 7 **OR** Use of factor trees	2 × 2 × 3 × 7	2	**M1** for a systematic method of at least 2 correct divisions by a prime number or an equivalent factor tree or a full process with one calculation error **A1** for 2 × 2 × 3 × 7 or 2^2 × 3 × 7
(b)	LCM of 4, 6 and 8 is **24** **OR** Red = after 4, 8, 12,	Midday on the following day	2	**M1** for an attempt to find the LCM **A1** for midday (or equivalent) the next day

	16, 20, **24**, 28, ... Blue = after 6, 12, 18, **24**, 30, 36, ... White = after 8, 16, **24**, 32, 40, ... **OR** Table of times from midday onwards into the next day, with indication when a red, blue and white pill are to be taken.			**OR** **M1** for listing multiples of 4, 6 and 8 **A1** for midday (or equivalent) the next day **OR** **M1** for a correct timetable showing when pills are taken **A1** for midday (or equivalent) the next day
				Total for Question: 4 marks

M5.

	Working	Answer	Mark	Additional Guidance
(a)	2)252 2)126 3) 63 or factor trees 3) 21 7) 7 1	2 × 2 × 3 × 3 × 7	3	**M1** for attempt at continual prime factorisation (at least 2 correct steps); could be shown as a factor tree **OR** sight of at least one each of 2, 3, 7 as factors of 252 **A1** for a fully correct factor tree or 2, 2, 3, 3, 7 which may include 1, but no other numbers **A1** $2 \times 2 \times 3 \times 3 \times 7$ or $2^2 \times 3^2 \times 7$ oe
(b)	HCF: The numbers must be $3n$ and $3m$ where n and m are coprime and at most one is a multiple of 3 LCM: Factors of 45 are 1, 3, 5, 9, 15, 45	9 and 15 or 3, 45	3	**B3** cao (**B2** for 2 numbers with HCF of 9 or LCM of 15) (**B1** for any attempt to list any 4 factors of 45 or any 4 multiples of 3).
				Total for Question: 6 marks

M6.

Working	Answer	Mark	Additional Guidance
2)252 2)126 3) 63 or factor trees 3) 21 7) 7 1	2 × 2 × 3 × 3 × 7	3	**M1** for attempt at continual prime factorisation (at least 2 correct steps); or two stages of a factor tree with the first step completely correct and the following step at least partially correct, **OR** sight of at least one each of 2, 3, 7 as factors of 252. **A1** Fully correct factor tree of a list of 2, 2, 3, 3, 7 which may include 1 but no other numbers. **A1** 2 × 2 × 3 × 3 × 7 or $2^2 \times 3^2 \times 7$ oe
			Total for Question: 3 marks

M7.

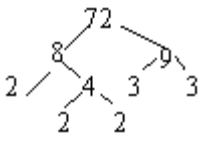
	Working	Answer	Mark	Additional Guidance
(a)	2 | 84 2 | 42 3 | 21 | 7 84 2 42 2 21 3 7	2 × 2 × 3 × 7	3	**M2** for a full systematic method of at least 3 divisions by prime numbers oe factor trees, condone one calculation error. (**M1** for 84 written as either 2 × 42 or 3 × 28 or 7 × 12 oe or equivalent division or a full process with 2 calculation errors) **A1** for 2 × 2 × 3 × 7 (accept $2^2 \times 3 \times 7$ but not 2, 2, 3, 7) [Note: 1 × 2 × 2 × 3 × 7 gets **M2A0**]
(b)		7	2	**M1** for listing factors of 35 and 84 (at least 3 correct for each, condoning one error. This could be in factor trees or factor pairs, etc) **A1** cao

	Total for Question: 5 marks

M8.

Working	Answer	Mark	Additional Guidance
24 48 72 36 72	72	2	**M1** for listing at least 1 multiple of 24 AND 1 multiple of 36 **A1** cao **OR** **M1** for 2, 2, 2, 3 (prime factors of 24) **OR** 2, 2, 3, 3 (prime factors of 36) (may be seen in factor tree or in repeated division) **A1** cao
			Total for Question: 2 marks

M9.

	Working	Answer	Mark	Additional Guidance
(a)	$x^2 = 72 \div 2$	6	2	**M1** for 72 ÷ 2 or 36 seen **A1** 6 or –6 or ± 6
(b)	72 = 2 × 36 = 2 × 2 × 18 = 2 × 2 × 2 × 9  	2 × 2 × 2 × 3 × 3	2	**M1** for a systematic method of at least 2 correct divisions by a prime number oe factor tree or a full process with one calculation error; can be implied by digits 2, 2, 2, 3, 3 on answer line **A1** for 2 × 2 × 2 × 3 × 3 or $2^3 \times 3^2$ oe [Note 1 × 2 × 2 × 2 × 3 × 3 gets **M1 A0**]

				Total for Question: 4 marks

M10.

	Working	Answer	Mark	Additional Guidance
(a)	$66 = 2 \times 33 = 2 \times 3 \times 11$	$2 \times 3 \times 11$	2	**M1** Successive division by 2 and 3 either by a factor tree or by repeated division **A1** cao
(b)	$132^2 = 4 \times 66^2$ $2^2 \times (2 \times 3 \times 11)^2$ **OR** $132^2 = 17424 = 2 \times 8712$ $= 2 \times 2 \times 4356 =$ $2^3 \times 2178 = 2^4 \times 1089$ $= 2^4 \times 3 \times 363 = ...$	$2^4 \times 3^2 \times 11^2$	2	**M1** $(2 \times 3 \times 11)^2$ **A1** $2^4 \times 3^2 \times 11^2$ oe **OR** **M1** $132^2 = 17424$ and at least 3 correct steps in for example the factor tree
				Total for Question: 4 marks

E1. Only about half of the candidature obtained the correct answer to this question. The most frequent mistake was to mistake the HCF for the LCM. Other candidates were able to gain one mark for finding the prime factors of 20 and 36 or for listing multiples of 20 and 36.

##

The main difficulty with this question was confusion between factors and multiples with lists of the factors of 8 and 12 leading to the HCF rather than LCM. Many candidates drew factor trees to identify prime factors but then gave 2 or 4 as the final answer. Venn diagrams were often well used to identify the LCM from the prime factors in the union.

##

Foundation

There were many good attempts at this question, with a significant number of correct solutions. Most candidates attempted to list the multiples, but were often handicapped by poor arithmetic, resulting in very long lists without a common multiple being found. Some who achieved 120 in both lists then miscounted the number of 24s or 40s they had in their list. The final mark was quite frequently lost because they thought they needed to add the number of sausages and rolls, arriving at 240 instead of 120.

Higher

It was pleasing to see how well candidates coped with this question. Nearly ¾ of the candidates scored all 5 marks with a further 11% scoring 4 marks. Most candidates were clearly aware of the need to find a common multiple of 24 and 40 but many had difficulty adding 24 successively to produce a list of multiples. This led to some very extensive searches as 120 was missed. The few who used factorisation or factor trees usually completed the question well showing their understanding of LCM and HCF. Once 3 packs of rolls and 5 packs of sausages (or multiples of these) were found, most could then go on to find the correct number of hot dogs. However a substantial number of candidates then either doubled their 120 or halved their 120 losing the final accuracy mark.

E5. Most candidates had a clear idea what to do on part (a) this question. Factor trees or repeated division were much in evidence. These were mostly correct as candidates could use a calculator. Most went on to write their answer as a product although there were a few who wrote them as a comma separated list or as a sum.

Part (b) proved to be more of a challenge as the candidates were faced with a demand that was unusual. The answer 9 and 15 was seen much more often than 3 and 45. However, just as common was 3 and 15, possibly coming from $3 \times 15 = 45$, identifying a correct HCF of 3 but failing to spot that the LCM was 15. Many candidates were confused over LCM in particular and gave values in the answer as multiples of 45, so 45 and 90 was a common pair as was 90 and 135.

E6. It was disappointing to see that so many candidates did not know what was expected of them in this question. There were some attempts using factor trees or continued division that usually resulted in some credit. Fully correct factor trees were sometimes spoiled by incorrect statements on the answer line eg 2 + 2 + 3 + 3 + 7 or 2, 2, 3, 3, 7. It was not uncommon for 9 or 63 to be left as prime factors.

E7. Errors in simple arithmetic computation were often the cause for loss of marks in part (a), even when appropriate methods were employed. Prime factors 2, 2, 3 and 7 were often left in a list (or at the ends of branches) with no attempt to write in the required product form. Part (b) was answered well, however some candidates attempted to find the LCM instead of the required HCF.

E8. Foundation

Many candidates understood that factors of 24 and 36 could be used. Those that just listed all the factors of the two numbers scored no marks. However, those that could break

down 24 or 36 into 2, 2, 2, 3 or 2, 2, 3, 3 were able to access one mark, but then lost the final mark by not knowing how to use them, generally writing 2 or 12 as their final answer. Only a few candidates provided any multiples of either of the two numbers. Those that did generally went on to score 1 or 2 marks. However, over ¾ of the candidates failed to score on this question.

Higher

The correct answer was obtained by approximately 30% of candidates. A further 24% gained one mark usually by breaking down one of the numbers into the product of its prime factors. The most common error was to give the HCF rather than the LCM.

E9. Foundation

It is true to say that performance in part (a) was better than that in part (b), however this question was, in general, not well answered. In part (a), one .mark could be gained by correctly finding a half of 72; many failed to get any further than this, usually dividing 36 by 2 to give 18 as their final answer. Some tried to find the square root of 72 and then divide the result by 2

Many candidates simply did not know where to start in part (b), often simply quoting factors of 72. Any attempts at drawing a factor tree often resulted in the award of one mark, but few completed the process to a correct conclusion. Answers of 2 × 2 × 2 × 9 and 2, 2, 2, 3, 3 and 2 + 2 + 2 + 3 + 3 were seen on a number of occasions.

Higher

In part (a) the majority of candidates divided 72 by 2 and then found the square root, usually just giving the positive solution which was sufficient for full marks. The common error was for candidates to try to find the square root of 72 and then divide by 2. A few divided by 2 twice and gave an answer of 18. Part (b) was generally answered well with the most common method being the use of a factor tree. Many fully correct answers were seen and most candidates were comfortable with index notation. Some made errors in their factor tree (often 6 = 3 × 3) and some who found the correct prime factors listed them on the answer line or wrote $2^3 + 3^2$.