HCF/LCM/Prime factors

Mark Scheme

Level	IGCSE
Subject	Maths
Exam Board	Edexcel
Topic	Number and Algebra
Sub Topic	HCF/LCM/Prime factors(Powers and roots)
Booklet	Mark Scheme

Time Allowed: 60 inutes

Score: /51

Percentage: /100

Grade Boundaries:

A*	A	B	C	D	E	U
>85%	75%	70%	60%	55%	50%	<50%

Question Number	Working	Answer	Mark	Notes	
1.	Fully correct factor tree or repeated division or 2, 2, 2, 5, 5 or $2 \times 2 \times 2 \times 5 \times 5$		3	M2	M1 for factor tree or repeated division with 2 and 5 as factors
		$2^3 \times 5^2$		A1	Also accept $2^3.5^2$
					Total 3 marks

Question Number	Working	Answer	Mark	Notes	
2. (a)	$75 = 3 \times 5^2$ and $90 = 2 \times 3^2 \times 5$ or 1,3,5,15,25,75 and 1,2,3,5,6,9,10,15,18,30,45,90 or 3×5		2	M1	Need not be products of powers; accept products or lists ie 3,5,5 and 2,3,3,5 Prime factors may be shown as factor trees or repeated division
		15		A1	
(b)	$\times 3^2 \times 5^2$ oe eg $6 \times 3 \times 5^2$ or 75,150,225,300,375,450 and 90,180,270,360,450		2	M1	Also award for $\dfrac{75 \times 90}{15}$
		450		A1	
					Total 4 marks

Question Number	Working	Answer	Mark	Notes	
3.	A product of 3 or more factors of 300 of which at least 2 are different primes (i.e. from 2, 3 or 5)			M1	e.g 2 x 3 x 50 (must multiply to 300) could be implied from a factor tree or division ladder
	All 5 correct prime factors & no extras (ignore 1's)	2, 2, 3, 5, 5 (with/without 1's) or 2^2 x 3 x 5^2 x 1 or $2^2 + 3 + 5^2$		M1	could be implied from a factor tree or division ladder 2 x 2 ≡ 2^2 5 x 5 ≡ 5^2
		2 x 2 x 3 x 5 x 5	3	A1	any order, do not accept inclusion of 1's accept **.** in place of x
					Total 3 marks

4.	(a)	$54 = 2 \times 3^3$ and $90 = 2 \times 3^2 \times 5$ **or** 1,2,3,6,9,18,27,54 and 1,2,3,5,6,9,10,15,18,30,45,90 **or** 2×3^2 oe		2	M1	Need not be products of powers; accept products or lists eg 2,3,3,3 and 2,3,3,5 accept 9, 2, 3 and 9, 2, 5 (may be seen in a Venn diagram or may be shown as factor trees or repeated division)
			18		A1	cao
	(b)	$2 \times 3^3 \times 5$ oe eg $6 \times 9 \times 5$ **or** 54,108,162,216,270 and 90,180,270		2	M1	Need not be products of powers; accept products or lists eg 2, 3, 3, 3, 5
			270		A1	cao
						Total 4 marks

5.		Factor tree or repeated division with 2 or more correct prime factors (2, 2, 3, 17) Fully correct factor tree or repeated division or 2, 2, 3, 17			M1	condone 1s; factors must multiply to 204
					M1	condone 1s
			2 x 2 x 3 x 17	3	A1	
						Total 3 marks

6.		Product of positive integer powers of both 3 and 5 only		2	M1	Powers and/or products may be evaluated eg 15
			$3^2 \times 5$ or 45		A1	Also accept 9×5
						Total 2 marks

Question	Working	Answer	Mark		Notes
7.	$20 = 2^2 \times 5$ and $24 = 2^3 \times 3$ or $2^3 \times 3 \times 5$ or 20,40,60,80,100,120 and 24,48,72,96,120		2	M1	
		120		A1	or $2^3 \times 3 \times 5$ oe
					Total 2 marks

8.	Fully correct factor tree or repeated division to reach prime factors (condone inclusion of 1's) or 3, 5, 5, 11 or 3 x 5 x 5 x 11 x 1			M2 Factors must multiply to 825 If not M2 then M1 for correct but incomplete factor tree/ division ladder which includes 2 different primes. (e.g. 25 x 3 x 11)
		3 x 5 x 5 x 11	3	A1 cao Accept $3 \times 5^2 \times 11$ and dots in place of multiplication signs.
				Total 3 marks
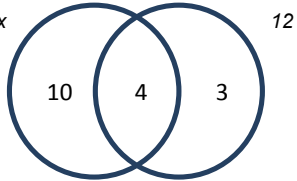
Question	Working	Answer	Mark	Notes
9. (a)	$252 = 2 \times 126 = 2 \times 2 \times 63 = 2 \times 2 \times 3 \times 21$			M1 for a process that isolates at least 2 correct prime factors e.g. $252 = 2 \times 126$, $126 = 3 \times 42$ or a factor tree with 2 primes from 2, 3 or 7 identified or repeated division
		$2 \times 2 \times 3 \times 3 \times 7$	2	A1 for $2 \times 2 \times 3 \times 3 \times 7$ oe with correct prime factors
(b)	$2^2 \times 3^2 \times 7 \times 2^4 \times 3 \times 5$			M1 "$2^2 \times 3^2 \times 7$" $\times 2^4 \times 3 \times 5$ or a fully correct factor tree or fully correct repeated division
		$2^6 \times 3^3 \times 5 \times 7$	2	A1 cao accept in any order
				Total 4 marks

Question	Working	Answer	Mark	Notes	
10. (a)			2	M1	For identifying 2^2, 3^3, and 5 or any product of integer powers of 2 and 3 and 5 where at least two powers are correct and the third is greater than 0 or 540
		$2 \times 2 \times 3 \times 3 \times 3 \times 5$		A1	Accept $2^2 \times 3^3 \times 5$
(b)			2	M1	For identifying 2^3, 3^4, 5 and 7 or any product of integer powers of 2 and 3 and 5 and 7, where at least three powers are correct and the fourth is greater than 0. Accept a product that includes 2,3 and 5 and 7 and multiplies to 22680 (Eg $2^3 \times 3^2 \times 5 \times 7 \times 9$) or 22680
		$2 \times 2 \times 2 \times 3 \times 3 \times 3 \times 3 \times 5 \times 7$		A1	Accept $2^3 \times 3^4 \times 5 \times 7$
					Total 4 marks

Question	Working	Answer	Mark	Notes	
11.	$2^3 \times 3^2$		2	M1	for identifying 2^3 **or** 3^2 **or** for 24, 48, 72 **and** 36, 72 **or** for an answer of 144 **or** 216
		72		A1	accept $2^3 \times 3^2$
					Total 2 marks

Ques	Working	Answer	Mark	Notes
12 a	224 = 2 × 112 = 2×2×56 = 2×2×2×28 = 2×2×2×2×14 2×2×2×2×2×7		3	M1 for at least 2 correct steps in repeated factorisation (may be seen in a tree diagram)
				A1 2, 2, 2, 2, 2, 7 (condone inclusion of 1)
		$2^5 \times 7$		A1 $2^5 \times 7$ NB: Candidates showing no working score 0 marks
b	56 + 32 + 16 56 + 32 + 14 56 + 28 + 16		2	M1 for any 3 correct distinct factors (excluding 1 and 224)
		eg. 56, 32, 16 or 56, 32, 14 or 56, 28, 16		A1 correct and have a sum between 99 and 110
				Total 5 marks

13 (a) (i)		$2^2 \times 5$		B1 for $2^2 \times 5$ oe or 20
(ii)		$2^3 \times 3 \times 5^2$	3	B2 for $2^3 \times 3 \times 5^2$ oe or 600 (B1 for any product using powers of 2 and 3 and 5 **or** at least 300, 600… **and** 40, 80, 120 …)
(b)	8 (= 2^n) **or** 2^3			M1 for one correct use of index laws eg. $8^5 \div 8^4$
		3	2	A1
				Total 5 marks

14.	$(12 =) 2 \times 2 \times 3$ or $(120 =) 2 \times 2 \times 2 \times 3 \times 5$ (condone 2,2,3 or 2,2,2,3,5) [factors could be seen at the end of a 'factor tree' or in a 'factor ladder'] **or** Venn diagram with the middle and one other region correct: *x* ⟋ ⟍ *12* (10 (4) 3) Where 10 may be 2,5 and 4 may be 2,2		2	M1	**or** for a <u>list</u> of at least 5 consecutive multiples of 4 **or** a <u>list</u> of at least 5 factors of 120 **or** for $12x = 120 \times 4$ oe (eg —— × 4(= *x*)) **or** $12 \div 4(= 3)$ and $120 \div$ "3"
		40		A1	accept $2 \times 2 \times 2 \times 5$ **or** $2^3 \times 5$
					Total 2 marks

Q	Working	Answer	Mark		Notes
15.	$792 = 2 \times 396 = 2 \times 2 \times 198$ $= 2 \times 2 \times 2 \times 99 = 2 \times 2 \times 2 \times 3 \times 33$		3	M1	For at least 2 correct steps in repeated factorisation (may be seen in a tree diagram or 'ladder')
	2, 2, 2, 3, 3, 11			A1	Condone inclusion of 1 (maybe a fully correct tree or factor ladder)
		$2 \times 2 \times 2 \times 3 \times 3 \times 11$		A1	Or $2^3 \times 3^2 \times 11$ NB: Candidates showing no working score 0 marks
					Total 3 marks

16.	$20 = 2, 2, 5$ $140 = 2, 2, 5, 7$ $420 = 2, 2, 3, 5, 7$			M1	For identifying the prime factors for 2 of the 3 numbers 20,140,420 (can be implied by a factor tree, repeated division or Venn diagram) or For a complete Venn diagram for x and 140 with 20 in the intersection or $x = 20 \times 3$ or $20 \times 7 \times y = 420$ or $\frac{420}{20 \times 7}$ or At least the 1st 3 multiples of 20 or $140x = 420 \times 20$ oe
		60	2	A1	Allow 2×2×3×5
					Total 2 marks