

Factors, multiples and primes

Foundation and Higher tiers | Total marks: 59

Marks

- M** Method mark, for a correct method. It can be implied by a correct answer.
- A** Accuracy mark, for a correct answer. It needs the method mark before it.
- B** A mark for a correct value or statement, with or without working.
- ft** Follow through: the mark is given for using an earlier wrong answer correctly.
- oe** Or equivalent.
- [a, b]** Any value from a to b inclusive.

Questions

Q	Skill	Spec	Tier	Grade	Calculator	Marks
1	Multiples, primes and factors	N4	Foundation	1	No	3
2	Listing factors	N4	Foundation	2	No	2
3	Common multiples	N4	Foundation	2	No	1
4	Factors and multiples from clues	N4	Foundation	3	No	2
5	Highest common factor	N4	Foundation	3	No	2
6	Prime numbers: a counterexample	N4	Foundation	3	No	1
7	HCF and LCM from a Venn diagram	N4	Foundation	4	No	3
8	Prime factorisation in index form	N4	Foundation	4	No	3
9	Lowest common multiple in context	N4	Foundation	5	No	3
10	Numbers from their HCF and LCM	N4	Foundation	6	No	3
11	Prime factors and square and cube numbers	N4	Foundation	6	No	3
12	HCF and LCM in index form, working backwards	N4	Foundation	7	No	2
13	Raffle winners: divisibility by 23	N4	Foundation	3	Yes	4
14	Testing for a prime	N4	Foundation	4	Yes	2
15	Recognising square and cube numbers	N6 N4	Foundation	4	Yes	3
16	Multiples and common multiples in context	N4	Foundation	4	Yes	3

Q	Skill	Spec	Tier	Grade	Calculator	Marks
17	Factors in context	N4	Foundation	4	Yes	3
18	Highest common factor in context	N4	Foundation	5	Yes	3
19	Lowest common multiple above a limit	N4	Foundation	5	Yes	3
20	Prime factorisation of a large number	N4	Foundation	5	Yes	3
21	Highest common factor of amounts of money	N4	Foundation	5	Yes	4
22	Testing numbers for primes	N4	Foundation	5	Yes	3
	Total					59

Question 1 N4 · Foundation · Grade 1 · 3 marks

Q	Answer	Mark	Comments
1(a)	24	B1	
1(b)	17	B1	
1(c)	9	B1	

Question 2 N4 · Foundation · Grade 2 · 2 marks

Q	Answer	Mark	Comments
2	6 and 14	B2	B1 for one correct

Question 3 N4 · Foundation · Grade 2 · 1 mark

Q	Answer	Mark	Comments
3	48	B1	

Question 4 N4 · Foundation · Grade 3 · 2 marks

Q	Answer	Mark	Comments
4	20	B2	B1 for 4, 12, 20 and 60 listed, or for 4 and 20

Question 5 N4 · Foundation · Grade 3 · 2 marks

Q	Answer	Mark	Comments
5(a)	48 is not a factor of 16 or 24	B1	oe, such as 48 is a common multiple, or 48 is the lowest common multiple, or the HCF cannot be bigger than 16
5(b)	8	B1	

Question 6 N4 · Foundation · Grade 3 · 1 mark

Q	Answer	Mark	Comments
6	2 + an odd prime, with an odd total	B1	such as $2 + 3 = 5$ or $2 + 11 = 13$

Question 7 N4 · Foundation · Grade 4 · 3 marks

Q	Answer	Mark	Comments
7(a)	6	B1	
7(b)	$3 \times 5 \times 2 \times 3 \times 2 \times 7$	M1	oe, the product of all the numbers in the diagram
	1260	A1	

Question 8 N4 · Foundation · Grade 4 · 3 marks

Q	Answer	Mark	Comments
8(a)	a correct factor tree or repeated division, with at least two correct steps	M1	oe 2, 2, 3, 3, 7
	$2^2 \times 3^2 \times 7$	A1	oe in index form
8(b)	$2^2 \times 3^3 \times 7^2$	B1ft	ft their (a)

Question 9 N4 · Foundation · Grade 5 · 3 marks

Q	Answer	Mark	Comments
9	lists multiples of 14 and of 21, or finds the LCM 42	M1	oe, or 7:42 am
	7:42 am, 8:24 am, 9:06 am, 9:48 am	M1	oe, or $180 \div 42 = 4.2...$
	4	A1	

Question 10 N4 · Foundation · Grade 6 · 3 marks

Q	Answer	Mark	Comments
10	both numbers are multiples of 8 and factors of 240	M1	oe, such as 32, 40, 48 and 56 listed as the multiples of 8 from 31 to 59
	tests a pair, such as 32 and 40 (LCM 160) or 40 and 48	M1	oe, or $8 \times 240 = 1920 =$ product of the numbers
	40 and 48	A1	

Question 11 N4 · Foundation · Grade 6 · 3 marks

Q	Answer	Mark	Comments
11(a)	5	B1	
11(b)	$2^6 \times 3^3 \times 5^3$, or $2^2 \times 3 \times 5^2$	M1	oe, the powers needed
	300	A1	

Question 12 N4 · Foundation · Grade 7 · 2 marks

Q	Answer	Mark	Comments
12(a)	2	B1	$12 = 2^2 \times 3$
12(b)	4	B1	

Question 13 N4 · Foundation · Grade 3 · 4 marks

Q	Answer	Mark	Comments
13(a)	each number divided by 23, or $437 \div 23 = 19$ seen	M1	oe, at least three divisions shown
	437, 483, 598	A1	and no others
13(b)	$2000 \div 23$ or 86.9...	M1	oe, or $23 \times 86 = 1978$
	2001	A1	

Question 14 N4 · Foundation · Grade 4 · 2 marks

Q	Answer	Mark	Comments
14	divides 391 by primes in order, at least as far as 17	M1	or any correct method to find a factor
	No with $391 = 17 \times 23$	A1	oe, or $391 \div 17 = 23$

Question 15 N6 N4 · Foundation · Grade 4 · 3 marks

Q	Answer	Mark	Comments
15(a)	2197, 2744, 3375, 4096	B2	and no others. B1 for three correct with no more than one wrong
15(b)	4096 with $64^2 = 4096$	B1	oe, such as $\sqrt{4096} = 64$

Question 16 N4 · Foundation · Grade 4 · 3 marks

Q	Answer	Mark	Comments
16(a)	38	B1	
16(b)	117 as the first locker with both, or lists multiples of 13 and of 9	M1	oe, such as 13×9
	4	A1	

Question 17 N4 · Foundation · Grade 4 · 3 marks

Q	Answer	Mark	Comments
17	432 divided by at least three numbers from 16 to 24	M1	or factor pairs of 432 listed
	two of 16, 18, 24	M1	
	16, 18, 24	A1	and no others

Question 18 N4 · Foundation · Grade 5 · 3 marks

Q	Answer	Mark	Comments
18(a)	lists factors of 90 and 126, or $90 = 2 \times 3^2 \times 5$ and $126 = 2 \times 3^2 \times 7$	M1	oe, or a common factor greater than 9
	18	A1	
18(b)	7	B1ft	ft $126 \div$ their (a)

Question 19 N4 · Foundation · Grade 5 · 3 marks

Q	Answer	Mark	Comments
19	a method for the LCM of 12, 15 and 18, or 180	M1	such as $2^2 \times 3^2 \times 5$, or lists of multiples
	$1000 \div 180$ or 5.5... or 180×6	M1	oe, ft their LCM
	1080	A1	

Question 20 N4 · Foundation · Grade 5 · 3 marks

Q	Answer	Mark	Comments
20(a)	a correct factor tree or repeated division, with at least two correct steps	M1	such as $23\,595 = 5 \times 4719$ and $4719 = 3 \times 1573$
	$3 \times 5 \times 11^2 \times 13$	A1	oe in index form
20(b)	not every power is even	B1	oe, such as 3, 5 and 13 appear only once. Accept $\sqrt{23\,595} = 153.6...$ is not whole

Question 21 N4 · Foundation · Grade 5 · 4 marks

Q	Answer	Mark	Comments
21(a)	$805 = 5 \times 7 \times 23$ or $1127 = 7^2 \times 23$	M1	oe, or a common factor of 805 and 1127 found, such as 7 or 23
	7×23 or 161	M1	the HCF
	£1.61	A1	accept 161p
21(b)	12	B1ft	ft $805 \div$ their 161 + $1127 \div$ their 161

Question 22 N4 · Foundation · Grade 5 · 3 marks

Q	Answer	Mark	Comments
22	shows 901 is not prime, $901 = 17 \times 53$	M1	oe, or shows 901, 903 and 905 each have a factor
	divides 907 by every prime up to 29	M1	oe, $\sqrt{907} = 30.1...$
	907	A1	with full working