

Expanding and factorising

Foundation and Higher tiers | Total marks: 63

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	Expanding and factorising a single bracket	A4	Foundation	2	No	3
2	Factorising, missing numbers	A4	Foundation	3	No	2
3	Expanding and simplifying	A4	Foundation	4	No	2
4	Expanding and factorising fully	A4	Foundation	4	No	3
5	Expanding double brackets	A4	Common	4	No	2
6	Squaring a bracket	A4	Common	4	No	2
7	Factorising a quadratic	A4	Common	5	No	2
8	The difference of two squares	A4	Common	5	No	3
9	Expanding double brackets for an area	A4	Common	5	No	3
10	Factorising fully: a common factor, then two brackets	A4	Common	6	No	2
11	Identities with unknown numbers	A4	Common	6	No	2
12	Expanding triple brackets	A4	Higher	6	No	3
13	Factorising quadratics of the form $ax^2 + bx + c$	A4	Higher	7	No	2
14	Factorising fully with the difference of two squares	A4	Higher	7	No	3
15	Identities with triple brackets	A4	Higher	8	No	4
16	Expanding and factorising the area of a ring	A4 G17 A17	Common	6	Yes	5

Q	Skill	Spec	Tier	Grade	Calculator	Marks
17	Expanding squares to form an equation	A4 A17	Common	6	Yes	4
18	Expanding with decimals in context	A4 A17	Common	6	Yes	5
19	Expanding to form a quadratic, then the formula	A4 A18 A21	Higher	7	Yes	6
20	Triple brackets and a decimal search	A4 A20	Higher	7	Yes	5
	Total					63

Question 1 A4 · Foundation · Grade 2 · 3 marks

Q	Answer	Mark	Comments
1(a)	$8y - 20$	B1	
1(b)	$3(2a + 5)$	B1	
1(c)	$-3x + 12$	B1	

Question 2 A4 · Foundation · Grade 3 · 2 marks

Q	Answer	Mark	Comments
2	4 in the first box	B1	
	5 in the second box	B1	

Question 3 A4 · Foundation · Grade 4 · 2 marks

Q	Answer	Mark	Comments
3	$4x + 23$	B2	B1 for $6x + 15 - 2x + 8$ seen, or for $4x + c$ or $ax + 23$

Question 4 A4 · Foundation · Grade 4 · 3 marks

Q	Answer	Mark	Comments
4(a)	$m^2 + 7m$	B1	
4(b)	$4p(3p - 2)$	B2	B1 for a correct partial factorisation, such as $4(3p^2 - 2p)$, $p(12p - 8)$ or $2p(6p - 4)$

Question 5 A4 · Common · Grade 4 · 2 marks

Q	Answer	Mark	Comments
5	$x^2 + 6x - 2x - 12$	M1	three of the four terms correct
	$x^2 + 4x - 12$	A1	

Question 6 A4 · Common · Grade 4 · 2 marks

Q	Answer	Mark	Comments
6	$(x - 5)(x - 5)$ with three of x^2 , $-5x$, $-5x$, $+25$ correct	M1	or a value that shows they differ, such as $x = 1$: 16 and -24
	No and $x^2 - 10x + 25$	A1	or No with a correct counter example

Question 7 A4 · Common · Grade 5 · 2 marks

Q	Answer	Mark	Comments
7	$(x + 4)(x - 7)$	B2	either order. B1 for $(x \pm 7)(x \pm 4)$

Question 8 A4 · Common · Grade 5 · 3 marks

Q	Answer	Mark	Comments
8(a)	$(y + 9)(y - 9)$	B1	either order
8(b)	$(63 + 37)(63 - 37)$ or 100×26	M1	
	2600	A1	M0 A0 for 2600 from squaring both numbers

Question 9 A4 · Common · Grade 5 · 3 marks

Q	Answer	Mark	Comments
9	$(2x + 3)(x + 4)$ with three of $2x^2$, $8x$, $3x$, 12 correct	M1	oe
	their $2x^2 + 11x + 12 - x^2$	M1	subtracts the area of the square
	$x^2 + 11x + 12$	A1	with full working

Question 10 A4 · Common · Grade 6 · 2 marks

Q	Answer	Mark	Comments
10	$3(x + 5)(x - 3)$	B2	B1 for $3(x^2 + 2x - 15)$, or for $(3x + 15)(x - 3)$ or $(x + 5)(3x - 9)$

Question 11 A4 · Common · Grade 6 · 2 marks

Q	Answer	Mark	Comments
11	$a = 7$	B1	
	$b = 1$	B1ft	ft their a , as $a - 6$

Question 12 A4 · Higher · Grade 6 · 3 marks

Q	Answer	Mark	Comments
12	two brackets expanded with three of the four terms correct	M1	such as $x^2 - x - 6$
	their three terms multiplied by the third bracket, with at least four of their six terms correct	M1	
	$x^3 + 3x^2 - 10x - 24$	A1	

Question 13 A4 · Higher · Grade 7 · 2 marks

Q	Answer	Mark	Comments
13	$(2x + 5)(3x - 4)$	B2	either order. B1 for $(2x \pm 5)(3x \pm 4)$, or for $6x^2 + 15x - 8x - 20$

Question 14 A4 · Higher · Grade 7 · 3 marks

Q	Answer	Mark	Comments
14	$2y(9x^2 - 4y^2)$	M1	the highest common factor taken out
	$(3x + 2y)(3x - 2y)$ seen	M1	the difference of two squares factorised
	$2y(3x + 2y)(3x - 2y)$	A1	any order

Question 15 A4 · Higher · Grade 8 · 4 marks

Q	Answer	Mark	Comments
15	$a = 4$	B1	from $3 \times -1 \times a = -12$
	$2x^2 + 5x - 3$	M1	any two brackets expanded correctly
	their three terms multiplied by the third bracket, with at least four of their six terms correct	M1	
	$b = 13$ and $c = 17$	A1	

Question 16 A4 G17 A17 · Common · Grade 6 · 5 marks

Q	Answer	Mark	Comments
16(a)	$\pi(r + 3)^2 - \pi r^2$	M1	oe, the area of the large circle subtract the area of the mirror
	$r^2 + 6r + 9$	M1	oe, $(r + 3)^2$ expanded correctly
	$\pi(6r + 9) = 3\pi(2r + 3)$	A1	with no errors seen
16(b)	$3\pi(2r + 3) = 150$ or $2r + 3 = \frac{150}{3\pi}$ (= 15.9...)	M1	oe
	6.5	A1	accept 6.5 or [6.45, 6.46]

Question 17 A4 A17 · Common · Grade 6 · 4 marks

Q	Answer	Mark	Comments
17	$(x + 2.6)^2 - (x - 1.4)^2 = 31.2$	M1	oe
	$x^2 + 5.2x + 6.76$ or $x^2 - 2.8x + 1.96$	M1	one square expanded correctly
	$8x + 4.8 = 31.2$	M1	oe
	3.3	A1	

Question 18 A4 A17 · Common · Grade 6 · 5 marks

Q	Answer	Mark	Comments
18(a)	$2x^2 - 0.8x + 1.5x - 0.6$	M1	oe, at least three of the four terms correct
	$2x^2 + 0.7x - 0.6$	A1	with no errors seen
18(b)	$x - 0.4 = 2.85$ or $x = 3.25$	M1	
	$2 \times 3.25^2 + 0.7 \times 3.25 - 0.6$ or 8×2.85 or 22.8	M1	oe, the area
	10	A1	from $22.8 \div 2.5 = 9.12$

Question 19 A4 A18 A21 · Higher · Grade 7 · 6 marks

Q	Answer	Mark	Comments
19(a)	$(6.5 + 2x)(4 + 2x)$	M1	oe, the length and width of the outer rectangle multiplied
	$26 + 13x + 8x + 4x^2$	M1	oe, with at least three terms correct, or $2 \times 6.5x + 2 \times 4x + 4x^2$ for the border in pieces
	$4x^2 + 21x + 26 - 26 = 30$ leading to $4x^2 + 21x - 30 = 0$	A1	with no errors seen
19(b)	$\frac{-21 \pm \sqrt{(21^2 - 4 \times 4 \times -30)}}{2 \times 4}$	M1	oe, or $(x + 2.625)^2 = 14.39...$
	1.168... or -6.42...	A1	one solution of the quadratic
	1.17	A1	and the negative solution rejected or not given. accept 1.17 or [1.168, 1.169]

Question 20 A4 A20 · Higher · Grade 7 · 5 marks

Q	Answer	Mark	Comments
20(a)	two of the brackets multiplied out with at least three of the four terms correct	M1	such as $x^2 + 3x + 2$
	their three terms multiplied by the third bracket, with at least four of their six terms correct	M1	
	$x^3 + 6x^2 + 11x + 6 = 200$ leading to $x^3 + 6x^2 + 11x = 194$	A1	with no errors seen
20(b)	substitutes 3.85 and 3.95 into $x^3 + 6x^2 + 11x$ (or into the volume)	M1	values 188.35... and 198.69..., or the volumes 194.35... and 204.69...
	188.35... < 194 and 198.69... > 194, so the solution is between 3.85 and 3.95 and rounds to 3.9	A1	a conclusion is needed