Q1. (a) Simplify

$8e - 3f - e - 3f$

.....

(2)

(b) Expand

$2(3c - 2)$

.....

(1)

(c) Factorise

$xy + 3x$

.....

(1)
(Total 4 marks)

Q2. (a) Simplify fully $3x + 5y + 2x - 6y$

.....

(2)

(b) Simplify fully $\frac{2x}{4xy}$

.....

(2)

(c) Expand and simplify $\frac{1}{2}(2x-6)$

.....

(1)
(Total 5 marks)

Q3. (a) Expand and simplify $3(2x + 3) + 2(x + 1)$.

.....

(2)

(b) Expand and simplify $(y – 3)(y + 4)$.

.....

(2)
(Total 4 marks)

Q4. (a) Simplify $m + m + m + m + m + m$

.....

(1)

(b) Simplify $x^7 \times x^5$

.....

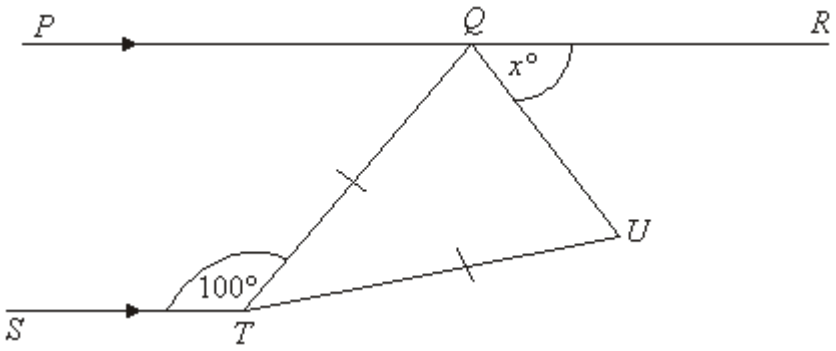
(1)

(c) Factorise $3y^2 + 2y$

.....

(1)
(Total 3 marks)

Q5.



PQR is a straight line parallel to *ST.*
QT = *UT*
Angle *STQ* = 100°.

Prove that angle *QTU* = (2*x* – 20)°.

(Total 5 marks)

Q6. (a) Simplify $4a + 3c - 2a + c$

.....

(1)

(b) $S = \frac{1}{2}at^2$

Find the value of S when $t = 3$ and $a = \frac{1}{4}$

$S =$ .....

(2)

(c) Factorise $x^2 - 5x$

.....

(2)

(d) Expand and simplify $(x + 3)(x + 4)$

.....

(2)

(e) Factorise $y^2 + 8y + 15$

.....

(2)

(Total 9 marks)

Q7. (a) Simplify $4p \times 5q$

.....

(1)

(b) Simplify $d \times d \times d \times d$

.....

(1)

(c) Expand $4(3a - 7)$

.....

(2)

(d) Expand and simplify $2(2n + 3) + 3(n + 1)$

.....

(2)

(e) Simplify $t \times t^2$

.....

(1)

(f) Simplify $m^5 \div m^3$

.....

(1)
(Total 8 marks)

Q8. (a) Simplify $4a + 3c - 2a + c$

.....

(1)

(b) $S = \frac{1}{2}at^2$

Find the value of S when $t = 3$ and $a = \frac{1}{4}$

S = ...

(2)

(c) Factorise $x^2 - 5x$

.....

(2)

(d) Solve $7x - 19 = 3(x - 3)$

x = ...

(3)
(Total 8 marks)

Q9. (a) Simplify $d + d + d + d + d$

.....

(1)

(b) Simplify $y^2 + y^2$

.....

(1)

(c) Expand $4(3a - 7)$

.....

(2)

(d) Simplify $t \times t^2$

.....

(1)

(e) Simplify $m^5 \div m^3$

.....

(1)
(Total 6 marks)

Q10. (a) Simplify $5bc + 2bc - 4bc$

.....

(1)

(b) Simplify $4x + 3y - 2x + 2y$

.....

(2)

(c) Simplify $m \times m \times m$

.....

(1)

(d) Simplify $3n \times 2p$

.....

(1)
(Total 5 marks)

Q11. (a) Simplify $5bc + 2bc - 4bc$

.....

(1)

(b) Simplify $4x + 3y - 2x + 2y$

.....

(2)

(c) Simplify $m \times m \times m$

.....

(1)

(d) Simplify $3n \times 2p$

.....

(1)

(e) Factorise $5m + 10$

.....

(1)
(Total 6 marks)

Q12. (a) Simplify $a \times a \times a$

.....

(1)

(b) Expand $5(3x - 2)$

.....

(1)

(c) Expand $3y(y + 4)$

.....

(2)

(d) Expand and simplify $2(x – 4) + 3(x + 2)$

.....

(2)

(e) Expand and simplify $(x + 4)(x – 3)$

.....

(2)
(Total 8 marks)

Q13. (a) Simplify $4x + 3y – 2x + 5y$

.....

(2)

Compasses cost *c* pence each.
Rulers cost *r* pence each.

(b) Write down an expression for the total cost, in pence, of 2 compasses and 4 rulers.

..... pence

(2)
(Total 4 marks)

Q14. (a) Simplify $8x - 4x$

.....

(1)

(b) Simplify $y \times y \times y$

.....

(1)

(c) Simplify $4x + 3y - 2x + 5y$

.....

(2)
(Total 4 marks)

Q15. (i) Simplify $13x - 24y + 17x + 14y$

.....

(ii) Solve $6(1 - 2x) - 3(x + 1) = 0$

.....

(Total 5 marks)

Q16. (a) Solve $5p - 16 = 4$

p = ...

(2)

(b) Solve $2q - 4 = 5q + 5$

q = ...

(2)

$y = 3(2x - 1) - 2(5 + 3x)$

(c) Find the value of y.

$y =$ .....

(2)
(Total 6 marks)

M1.

	Answer	Mark	Additional Guidance
(a)	$7e - 6f$	2	**B2** (**B1** for $7e$ or $-6f$ seen)
(b)	$6c - 4$	1	**B1** (accept $6 \times c - 4$, $c6 - 4$ or equivalent expansion)
(c)	$x(y + 3)$	1	**B1**
			Total for Question: 4 marks

M2.

	Answer	Mark	Additional Guidance
(a)	$5x - y$	2	**B2** for $5x - y$ cao (**B1** for $5x + ny$ or for $nx - y$)
(b)	$\frac{1}{2y}$	2	**B2** for $\frac{1}{2y}$ cao (**B1** for $\frac{2}{4y}$ or for $\frac{x}{2xy}$)
(c)	$x - 3$	1	**B1** for $x - 3$ cao
			Total for Question: 5 marks

M3.

	Working	Answer	Mark	Additional Guidance
(a)	$6x + 9 + 2x + 2 =$	$8x + 11$	2	**M1** for $3 \times 2x + 3 \times 3$ or $2 \times x + 2 \times 1$ or $6x + 9$ or $2x + 2$ or $8x$ or 11 **A1** for $8x + 11$ cao
(b)	$y^2 + 4y - 3y - 12$	$y^2 + y - 12$	2	**M1** for 3 out of 4 terms of $y \times y + 4 \times y - 3 \times y - 3 \times 4$ correct including signs, or 4 terms excluding signs **A1** for $y^2 + y - 12$ or $y^2 + 1y - 12$ cao
				Total for Question: 4 marks

M4.

	Answer	Mark	Additional Guidance
(a)	$6m$	1	**B1** cao
(b)	x^{12}	1	**B1** for x^{12} or x^{7+5}
(c)	$y(3y + 2)$	1	**B1** cao
			Total for Question: 3 marks

M5.

	Working	Answer	Mark	Additional Guidance

QWC (i, ii, iii)	Angle RQT= 100° (alternate angles are equal) Angle TQU = 100 – *x* Angle QUT = 100 – *x* (base angles of isos triangle) Angle QTU = 180 – (100 – *x* + 100 – *x*) angles in a triangle)	Proof	5	**B1** for angle RQT = 100° **B1** for angle TQU = 100 – *x* or angle QUT = 100 – *x* **B1** for completing the proof **C2** for all 3 reasons given **QWC: Proof should be clearly laid out with technical language correct, e.g. alternate angles are equal** [C1 for just 1 or 2 reasons given] **QWC: Proof should be clearly laid out with technical language correct, e.g. alternate angles are equal**
				Total for Question: 5 marks

M6.

	Working	Answer	Mark	Additional Guidance
(a)		$2a + 4c$	1	**B1** $2a + 4c$ or $2(a + 2c)$
(b)	$\frac{1}{2}x \times \frac{1}{4} \times (3)^2 =$ $\frac{1}{2} \times \frac{1}{4} \times 9 = 1.125$	1.125	2	**M1** for substitution: $\frac{1}{2} \times \frac{1}{4} \times 3^2$ oe **A1** 1.125, $1\frac{1}{8}$, $\frac{9}{8}$ oe
(c)		$x(x – 5)$	2	**B2** , accept $x(x + –5)$ (**B1** for x(linear expression in x) or $x – 5$ seen)
(d)	$x^2 + 3x + 4x + 12$	$x^2 + 7x + 12$	2	**B2** for fully correct (**B1** for 3 out of 4 terms correct in working including signs, **OR** 4 terms correct, with incorrect signs).
(e)		$(y + 3) \times (y + 5)$	2	**B2** for fully correct (**B1** for $(y + a)(y + b)$ with one of $ab = 15$, $a + b = 8$)

	Total for Question: 9 marks

M7.

	Working	Answer	Mark	Additional Guidance
(a)		$20pq$	1	**B1** for $20pq$ oe
(b)		d^4	1	**B1** for d^4 cao
(c)	$4 \times 3a - 4 \times 7$	$12a - 28$	2	**M1** for $4 \times 3a$ or 4×7 or $12a$ or 28 **A1** for $12a - 28$ cao
(d)	$4n + 6 + 3n + 3$	$7n + 9$	2	**M1** for $4n + 6$ or $3n + 3$ **A1** for $7n + 9$
(e)		t^3	1	**B1** for t^3 (accept t^{1+2} oe)
(f)		m^2	1	**B1** for m^2 (accept m^{5-3} oe)
				Total for Question: 8 marks

M8.

	Working	Answer	Mark	Additional Guidance
(a)		$2a + 4c$	1	**B1** cao Accept $2(a + 2c)$

(b)	½ × ¼ × $(3)^2$ = ½ × ¼ × 9 = 1.125	1.125	2	**M1** for substitution: ½ × ¼ × 3^2 oe **A1** 1.125, $1\frac{1}{8}, \frac{9}{8}$ oe
(c)		$x(x - 5)$	2	**B2** Accept $x(x + -5)$ (**B1** for x(linear expression in x) or $x - 5$ seen)
(d)	$7x - 19 = 3x - 9$ $7x - 3x = -9 + 19$ $4x = 10$	2.5	3	**M1** for expansion of brackets: $3x - 9$ **M1** for rearrangement of their two terms eg $7x - 3x = -9 + 19$ or an indication of how this should be done for both variable and number term. **A1** for 2.5 Accept $\frac{5}{2}, \frac{10}{4}$ oe
				Total for Question: 8 marks

M9.

	Working	Answer	Mark	Additional Guidance
(a)		$5d$	1	**B1** for $5d$ or $5 \times d$
(b)		$2y^2$	1	**B1** for $2y^2$ or $2 \times y^2$
(c)	$4 \times 3a - 4 \times 7$	$12a - 28$	2	**M1** for $4\times3a$ or 4×7 or $12a$ or 28 **A1** for $12a - 28$ cao
(d)		t^3	1	**B1** for t^3 (accept t^{1+2} oe)
(e)		m^2	1	**B1** for m^2 (accept m^{5-3} oe)
				Total for Question: 6 marks

M10.

	Answer	Mark	Additional Guidance
(a)	$3bc$	1	**B1** for $3bc$ (accept $3cb$ or $bc3$ or $cb3$ or $3 \times b \times c$ oe, but $7bc - 4bc$ gets no marks)
(b)	$2x + 5y$	2	**B2** for $2x + 5y$ (accept $x2 + y5$ or $2 \times x + 5 \times y$ or $x \times 2 + y \times 5$) [**B1** for $2x$ or $5y$ seen; accept $2 \times x$, $x2$, $5 \times y$, $y5$, etc.]
(c)	m^3	1	**B1** cao
(d)	$6np$	1	**B1** for $6np$ oe (accept $6pn$, $np6$, $pn6$ but NOT $6 \times p \times n$)
			Total for Question: 5 marks

M11.

	Answer	Mark	Additional Guidance
(a)	$3bc$	1	**B1** for $3bc$ (accept $3cb$ or $bc3$ or $cb3$ or $3 \times b \times c$ oe, but $7bc - 4bc$ gets 0)
(b)	$2x + 5y$	2	**B2** for $2x + 5y$ (accept $x2 + y5$ or $2 \times x + 5 \times y$ or $x \times 2 + y \times 5$) [**B1** for $2x$ or $5y$ seen; accept $2 \times x$, $x2$, $5 \times y$, $y5$, etc.]
(c)	m^3	1	**B1** cao
(d)	$6np$	1	**B1** for $6np$ oe (accept $6pn$, $np6$, $pn6$ but NOT $6 \times p \times n$)
(e)	$5(m + 2)$	1	**B1** for $5(m + 2)$ or $5(2 + m)$. Accept $(5 – 0)(m + 2)$ or $(3 + 2)(m + 2)$
			Total for Question: 6 marks

M12.

	Working	Answer	Mark	Additional Guidance
(a)		a^3	1	**B1** for a^3 cao
(b)	$5 \times 3x - 5 \times 2$	$15x - 10$	1	**B1** for $15x - 10$ cao
(c)	$3y \times y + 3y \times 4$	$3y^2 + 12y$	2	**M1** for $3y \times y + 3y \times 4$ or $3y^2 + a$ or $3y^2 + ay$ or $b + 12y$ or $by^2 + 12y$ where a, b are integers, and can be zero **A1** for $3y^2 + 12y$ or $3 \times y^2 + 12 \times y$ NB: If more than 2 terms in expansion M0A0
(d)	$2x - 8 + 3x + 6$	$5x - 2$	2	**M1** for $2 \times x - 2 \times 4$ or $2x - 8$ or $3 \times x + 3 \times 2$ or $3x + 6$ **A1** for $5x - 2$ cao
(e)	$x^2 + 4x - 3x - 12$	$x^2 + x - 12$	2	**M1** for 4 terms correct with or without signs, or 3 out of no more than 4 terms, with correct signs (the terms may be in an expression or table) or $x(x - 3) + 4(x - 3)$ or $x(x + 4) - 3(x + 4)$ **A1** for $x^2 + x - 12$ cao
				Total for Question: 8 marks

M13.

	Answer	Mark	Additional Guidance

(a)	$2x + 8y$	2	**B2** for $2x + 8y$ oe [**B1** for $2x$ or $8y$ seen] {Note:$-8y$ seen with no working gets **B0** $4x + 2x = 6x$ gets **B0**}
(b)	$2c + 4r$	2	**B2** for $2c + 4r$ oe [**B1** for $2c$ or $4r$ or seen] Ignore any Left Hand Side = $2c + 4r$ {Note: ignore units or use of 'p'}
			Total for Question: 4 marks

M14.

	Answer	Mark	Additional Guidance
(a)	$4x$	1	**B1** for $4x$ (accept $4 \times x$, $x \times 4$, $x4$)
(b)	y^3	1	**B1** cao
(c)	$2x + 8y$	2	**B2** for $2x + 8y$ oe [**B1** for $2x$ or $8y$ seen] {Note: $-8y$ seen with no working gets B0 $4x + 2x = 6x$ gets B0}
			Total for Question: 4 marks

M15.

	Working	Answer	Mark	Additional Guidance

(i)		$30x - 10y$	5	**B2** cao (If no marks then B1 $30x$, B1 $10y$)
(ii)	$6 - 12x - 3x - 3 = 0$ $3 - 15x = 0$ $15x = 3$	$\frac{1}{5}$		**M1** for correct multiplication of brackets to get $6 - 12x - 3x - 3$ **A1** $3 - 15x = 0$

				Total for Question: 5 marks

M16.

	Working	Answer	Mark	Additional Guidance
(a)	$5p = 20$	4	2	**M1** add 16 to both sides **A1** cao
(b)	$– 4 – 5 = 5q – 2q$	–3	2	**M1** for correct method isolate ± 3q **A1** cao
(c)	$6x – 3 − 10 – 6x =$	–13	2	**M1** at least one expansion correct **A1** cao
				Total for Question: 6 marks

E1. This algebra question was quite well answered. Almost 90% of candidates were awarded some credit for their answers to part (a). Common incorrect answers seen included 7e and 7e +6f. These could be awarded 1 mark for one correct term. The second part of the question was correctly answered by 84% of candidates whilst the success rate in the last part was 65%. In part (c) common incorrect answers included $3x^2y$, $4xy$ and $x(y + 2x)$.

E2. Part (a) was the most successful though a surprising number of candidates incorrectly oversimplified their correct answer. Part (b) and (c) were not well answered though some candidates gained partial credit in (b) for writing $\frac{x}{2xy}$ or $\frac{2}{4y}$.

E3. Only about one in three candidates scored full marks in this question.

In part (a) most candidates were able to expand at least one of the expressions "$3(2x + 3)$" and "$2(x + 1)$" successfully to gain 1 mark. However, it is disappointing to report that it was common to see candidates then attempting to multiply "$6x + 9$" and "$2x + 2$" or incorrectly combine them in some other way. Perhaps surprisingly, just as many candidates were successful in part (b) as in part (a). In this part of the question, in cases where a candidate could not be awarded both marks, examiners were often able to give one mark for either 3 out of 4 correct terms in their expansion or for 4 terms with some incorrect signs.

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In part (a) many demonstrated their confusion at algebra by giving as an answer m^5 or even 5^m. Part (b) was better answered, but in part (c) the different rules applied to algebra and numbers

again confused, with the additional complication of one letter not having an index. Success rates were therefore low.

E6. This question gave students the opportunity to display their skills of algebraic manipulation and of algebraic substitution.
Usually candidates were successful on part (a), although there were many wrong answers, mainly from a misunderstanding of the relationship of the sign in a term with the term it acted on.

Part (b) had many cases of poor substitution, where, for example, $\frac{1}{4} \times 3^2$ was evaluated as $\left(\frac{1}{4} \times 3^2\right)$

Parts (c), (d) and (e) were all well done. The most common error in (c) was the difference of 2 squares misunderstanding as $(x - 5)(x + 5)$ or $(x - 2.5)(x + 25)$. The clumsy, but correct was awarded both marks.

On (d), the characteristic $x^2 + 7x + 7$ was occasionally seen and on (e) the 'factorisation' $y(y + 8) + 15$

E7. This question was done well by the majority of the candidates. In part (a), most candidates were able to write down the answer 20*pq*. Common incorrect answers here were 4*p*5*q*, 9pq, 20p^2 and 20*q*^{2}. In part (b), the vast majority of candidates were able to write down the answer d^4. A very common incorrect answer here was 4*d*. In part (c), about half the candidates were able to gain both marks. Common incorrect answers here were 12*a* – 7, 7*a* – 28 and 12*a* – 21. In part (d), about three quarters of the candidates were able to score both marks and many that didn't were able to score a mark for either 4*n* + 6 or 3*n* + 3. Common incorrect answers here were (4*n* + 6) + (3*n* + 1) = 7*n* + 7 and (4*n* + 3) + (3*n* + 3) = 7*n* + 6 (each gaining 1 mark); and (4*n* + 3) + (3*n* + 1) = 7*n* + 4 (for 0 marks). A surprising number of candidates multiplied the expressions (4*n* + 3) × (3*n* + 3) instead of adding them. Parts (e) and (f) were generally done well. Common incorrect answers here were (*t* × *t*^{2} =) *t*^{2} and (*m*^{5} ÷ *m*^{3} =) *m*$^{5/3}$ or *m*^{15}.

E8. In part (a) many candidates were able to combine one of the letters, but rarely both. Weaker candidates frequently spoilt their answer by incorrect simplification, for example $4a + 2a = 6a$, and $2a + 4c = 6ac$. In part (b) there was little understand of formulae. Many added the three pats of the formulae, whilst squaring was almost arbitrary. Weaker candidates did not know what to do with the 1/2. Even with an answer as short as 1.125 there were instances of candidates rounding off this answer to 1 d.p. Part (c) was done well by those candidates who understood what was meant by "factorise". A few candidates gained a mark for multiplying out the bracket in part (d), but most failed to gain any marks. Algebraic methods were very confused, with few manipulating the terms correctly.

E9. As might be expected, part (a) was answered with the most success. The most common incorrect answer was d5. By comparison, part (b) was answered poorly. Many candidates gave the answer as y^7, $2y$ 4 or $4y$. Some, though, did not attempt it. Just over one quarter of candidates managed to expand 4(3a – 7) correctly in part (c). Some only multiplied one term inside the bracket by 4, most often resulting in 12a – 7. These candidates gained 1 mark as did the many who showed either 4 × 3a or 4 × 7. There were some who, having got 12a – 28, then decided that this answer could be simplified. More than half of the candidates got either part (d) or part (e) correct but fewer than expected got both parts correct. A common incorrect answer in (d) was t2. This could have arisen because candidates did not understand that t meant t1 or because they did know this but multiplied the indices. Other common incorrect answers were $2t^2$ and $3t$. In (e) common incorrect answers were m^8 and $m^{\frac{5}{3}}$.

E10. This was a good first question with virtually all candidates able to pick up some marks. Errors made were usually, not fully simplifying in part (a) leaving an answer of $7bc – 4bc$. In part (b), $6x \pm 5y$ was the most common incorrect answer offered but $7xy – 4xy = 3xy$ was seen several times. $3m$ and $5np$ were the most common errors made in parts (c) and (d) respectively.

E11. This question proved to be a good discriminator. 68% of candidates gave a correct and fully simplified answer to the first part of the question. A significant proportion only completed a partial simplification and left the answer as $7bc - 4bc$. In part (b), candidates who showed the collection of like terms in their working seemed to gain more marks. Many candidates appeared confused about signs and so gave $6x$ or $-5y$ terms. Answers to part (c) were split mostly between $3m$ and m^3 with about two thirds of candidates giving the correct response. Only occasionally was it not possible to distinguish whether the candidate had written $m3$ or m^3. The answer $5np$ was common in part (d). Sometimes candidates left multiplication signs in their answers. Only about 10% of candidates could factorise the expression given in part (e) correctly. $15m$ and $5(m + 10)$ were common incorrect answers seen.

E12. Parts (a) and (b) were generally well answered. The most common incorrect answer in (a) was 3a. In part (c) Most candidates managed to expand $3y \times y$ correctly and simplify to $3y^2$ but a few did not multiply $3y$ by 4 and just wrote 12 rather than $12y$. Hence $3y^2 + 12$ was the most common error seen. Expansion of both brackets in part (d) did not usually cause problems although a few multiplied the brackets together. Simplification caused more difficulties with the –8 term added leading to $5x + 14$ or a common arithmetic slip giving $2x + 3x = 6x$ Again, in part (e) the expansion of brackets was often successfully tackled but simplification led to more errors, caused usually by difficulties dealing with the negative terms. In the expansion, 4 and –3 were added rather than multiplied to give 1 leading to $x^2 + x + 1$ or just $x^2 + 1$. $-3x$ and $4x$ were sometimes combined to give $-x$ and a common mistake was to ignore the – sign and add these 2 terms to give $x^2 + 7x - 12$.

E13. Part (a) was answered very well by most candidates. For some, the signs caused a problem with $2x - 8y$ being the most common incorrect answer. Most candidates were also successful in part (b). Some, though, wrote down $2c + 4r$ in their working and then made this equal to $6cr$, or even $8cr$, and lost a mark. A few candidates gave the answer as $c^2 + r^4$. Many candidates did not know the difference between an expression and an equation but they were not penalised for this.

E14. In part (a), the majority of candidates gained the mark, although answers of $12x$ and 4 were often seen. $3y$ was the most common incorrect answer seen in part (b) and only about one half of the candidature gave a correct answer of y^3.

Only 40% of candidates gained full marks in part (c) of this question; the most common error being either to add the two terms in x to give $6x$ or to write $-8y$ instead of $+8y$. Some candidates, in their working, wrote $2x + 8y$ and then gave an answer of $10xy$ or similar. Even though the correct answer has been seen, in these cases just 1 of the 2 marks is awarded.