1. Tayub said, "When $x = 3$, then the value of $4x^2$ is 144".

Bryani said, "When $x = 3$, then the value of $4x^2$ is 36".

(a) Who was right?

Explain why.

(2)

(b) Work out the value of $4(x + 1)^2$ when $x = 3$.

....

(1)
(Total 3 marks)

2. $D = ut + kt^2$

$u = 20$
$t = 1.2$
$k = -5$

(a) Work out the value of D.

....

(2)

$D = 50$
$t = 5$
$k = -5$

(b) Work out the value of u.

....
(2)

(c) Make u the subject of the formula

$$D = ut + kt^2$$

u = ...
(2)
(Total 6 marks)

3. $v = u + 10t$

Work out the value of v when

$u = -2.5$ and $t = 3.2$

v = ………………………
(Total 2 marks)

4. Work out the value of $\frac{p(q-3)}{4}$ when $p = 2$ and $q = -7$

....

(Total 3 marks)

5. Tom the plumber charges £35 for each hour he works at a job, plus £50.
The amount Tom charges, in pounds, can be worked out using this rule.

Multiply the number of hours he works by 35 Add 50 to your answer

Tom works for 3 hours at a job.

(a) Work out how much Tom charged.

£ ....

(2)

At his next job Tom charged the customer £260

(b) How many hours did Tom work?

.... hours

(3)

Tom works h hours at a job.
He charges P pounds.

(c) Write down a formula for P in terms of h.

....

(3)
(Total 8 marks)

6. (a) Work out the value of $3x - 4y$ when $x = 3$ and $y = 2$

....

(2)

(b) Work out the value of $\frac{p(q-3)}{4}$ when $p = 2$ and $q = -7$

....

(3)
(Total 5 marks)

7. Tom the plumber charges £35 for each hour he works at a job, plus £50.
The amount Tom charges, in pounds, can be worked out using this rule.

Multiply the number of hours he works by 35 Add 50 to your answer

Tom charged a customer £260 for a job.

(a) How many hours did Tom work?

.... hours

(3)

Tom works h hours at a job.
He charges P pounds.

(b) Write down a formula for P in terms of h.

....

(3)
(Total 6 marks)

8. (a) Expand and simplify $(x + 3)(x – 4)$

....

(2)

(b) Factorise $x^2 + 7x + 10$

....

(2)

(c) $p = 3t + 4(q - t)$

Find the value of q when $p = 6$ and $t = 5$

q = ...

(3)
(Total 7 marks)

9. The cost of hiring a car can be worked out using this rule.

Cost = £90 + 50p per mile

Bill hires a car and drives 80 miles.

(a) Work out the cost.

£ ....

(2)

The cost of hiring a car and driving m miles is C pounds.

(b) Complete the formula for C in terms of m.

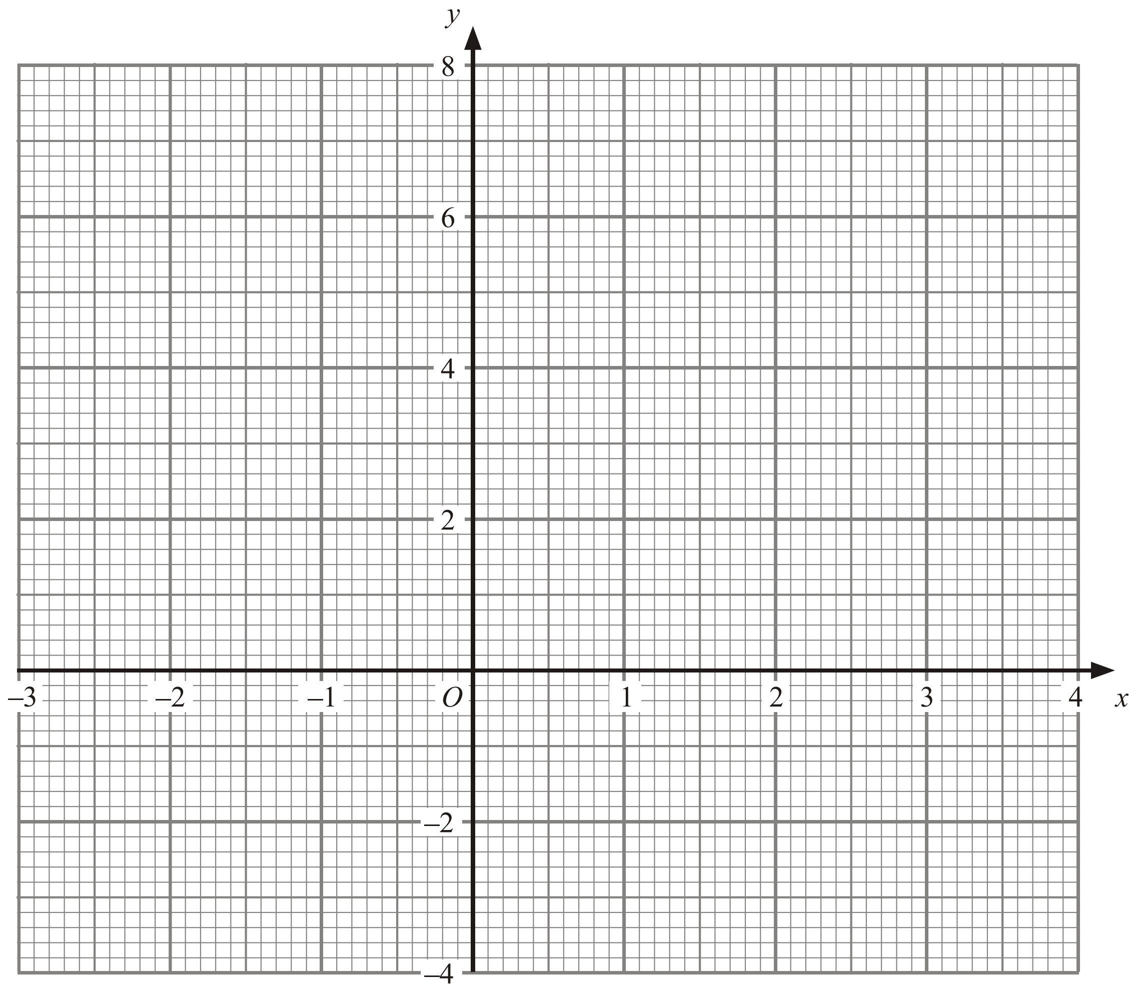
C = ...

(2)
(Total 4 marks)

10. (a) Complete this table of values for $y = 2x - 1$

x	–1	0	1	2	3	4
y		–1		3	5	

(2)



(b) On the grid, draw the graph of $y = 2x - 1$

(2)
(Total 4 marks)

11. The cost of hiring a car can be worked out using this rule.

Cost = £90 + 50p per mile

Bill hires a car and drives 80 miles.

(a) Work out the cost.

£ ....

(2)

The cost of hiring a car and driving *m* miles is *C* pounds.

(b) Complete the formula for *C* in terms of *m*.

C = ...

(2)

Zara hired a car.

The cost is £240

(c) How many miles did Zara drive?

.... miles

(3)

(Total 7 marks)

12. (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)

13. $v^2 = u^2 + 2as$

$u = 6$
$a = 2.5$
$s = 9$

(a) Work out a value of v.

v = ...

(3)

(b) Make s the subject of the formula $v^2 = u^2 + 2as$

s = ...

(2)
(Total 5 marks)

14. $F = 1.8C + 32$

(a) Work out the value of F when $C = -8$

....

(2)

(b) Work out the value of C when $F = 68$

....

(2)
(Total 4 marks)

15. $P = 4k - 10$

$P = 50$

(a) Work out the value of k.

....

(2)

$y = 4n - 3d$

$n = 2$
$d = 5$

(b) Work out the value of y.

....

(2)
(Total 4 marks)

16. T, x and y are connected by the formula

$$T = 5x + 2y$$

$x = -3$ and $y = 4$

(a) Work out the value of T.

T = ...

(2)

$T = 16$ and $x = 7$

(b) Work out the value of y.

$y =$ ....

(3)

(Total 5 marks)

17. Find the value of

$t^2 - 4t$ when $t = -3$

....

(Total 2 marks)

18. $P = x^2 - 5x$

Find the value of P when $x = -4$

$P =$ ....

(Total 2 marks)

19. $P = x^2 - 7x$

Work out the value of P when $x = -5$

$P =$ ……………
(Total 2 marks)

20. $P = Q^2 - 2Q$

Find the value of P when $Q = -3$

$P =$ ....…………….
(Total 2 marks)

21. $C = 2p - 5q$

$p = -3$
$q = 4$

Work out the value of C.

$C =$ ....
(Total 2 marks)

22. $P = 2x^2 + 3$

Find the value of P when $x = -5$

$P =$ ……………………
(Total 2 marks)

23. $P = \frac{m}{10}$

$m = 127$

(a) Work out the value of P.

$P =$ ....
(1)

$Q = 3c + 5d$

$c = -4$
$d = 6$

(b) Work out the value of Q.

Q = ...

(2)
(Total 3 marks)

1. (a) Bryani 2

M1 for 4×9 or $4 \times 3 \times 3$ or $4 \times x \times x$ or square x first or square 3 first
A1
SC 4×3^2 with Bryani scores B2

(b) 64 1

B1 cao

[3]

2. (a) 16.8 — 2

$20 \times 1.2 + -5 \times 1.2^2$
$24 - 7.2 =$

M1 for substituting correctly
A1 cao

(b) 35 — 2

$50 = 5u + -5 \times 25$
$50 = 5u - 125$
$5u = 175$

M1 for 50 = 5u – 125 oe
A1 for 35

(c) $\frac{D - kt^2}{T}$ — 2

$D - kt^2 = ut$

$u = \frac{D - kt^2}{T}$

B2 for $\frac{D - kt^2}{T}$ *oe*

(B1 for $\frac{D}{t} = \frac{ut + kt^2}{t}$ *or* $D - kt^2 = ut$
or one of two steps correct)

[6]

3. $-2.5 + 10 \times 3.2$
29.5 — 2

M1 for $-2.5 + 10 \times 3.2$
A1 for 29.5

[2]

4. $-7 - 3 = -10$
$2 \times -10 = -20$
$-20 \div 4 = -5$ — 3

M1 for substitution of 2 and −7 into p(q – 3) or sight of –20 or –14 – 6
M1 dep for ‘−20’ ÷ 4
A1 cao
B1 SC for sight of –10 if M0 awarded

[3]

5. (a) $3 \times 35 + 50$
$= 155$ — 2

M1 for 3 × 35 + 50 or digits 155 seen
A1 cao

(b) $260 - 50 = 210$
$210 \div 35 = 6$ — 3

M1 for 260 – 50 or 210 seen.
M1 for "260 – 50" ÷ 35 or 210 ÷ 35
A1 cao

SC B1 for starting at a number between 100 and 170 and adding at least two 35's and showing a total between 230 and 290

or

For adding at least three 35's, perhaps with other numbers, and showing a total between 180 and 240 (or between 230 and 290 if 50 is included in the sum)

(c) $P = 35h + 50$ — 3

B3 for $P = 35h + 50$ *or* $P = 35 \times h + 50$ *oe*
(B2 for correct RHS or $P = h + 50 \times 35$
or $P = 35h + k$ *where k is numerical oe)*
(B1 for P = some other linear expression in h,
or $h + 50 \times 35$ *or* $35h$ *seen)*
NB: P = h scores no marks; ignore £ signs.

SC B2 for $h = \dfrac{P - 50}{35}$

[8]

6. (a) $3 \times 3 - 4 \times 2$ or $9 - 8$
$= 1$ — 2

M1 for substitution of 3 and 2 into expression or 9 and 8 seen
A1 cao

(b) $-7 - 3 = -10$
$2 \times -10 = -20$
$-20 \div 4 = -5$ — 3

M1 for substitution of 2 and −7 into $p(q - 3)$ *or sight of -20 or –14 – 6*
M1 (dep) for "−20" ÷ 4
A1 cao
SC: B1 for –10 seen if M0

[5]

7. (a) 260 – 50 = 210
210 ÷ 35 =
= 6 3

M1 for 260 – 50 or 210 seen.

M1 for "260 – 50" ÷ 35 or 210 ÷ 35

A1 cao

(b) P = 35h + 50 3

B3 for P = 35h + 50 or P = 35 × h + 50 oe

(B2 for correct RHS or P = h + 50 × 35 or P = 35h + k where k is numerical oe)

(B1 for P = some other linear expression in h, or h + 50 × 35 or 35h seen)

NB: P = h scores no marks; ignore £ signs.

SC B2 for $h = \frac{P - 50}{35}$

[6]

8. (a) $x^2 - 4x + 3x - 12 = x^2 - x - 12$
$= x^2 - x - 12$ 2

M1 for exactly 4 terms correct ignoring signs (eg x^2, 4x, 3x, 12) or 3 correct terms out of 4 terms with correct signs (eg 3 out of 4 of x^2, –4x, +3x, –12)

A1 cao

(b) $(x + 2)(x + 5)$
$(x + 2)(x + 5)$ 2

B2 cao

(B1 for exactly one of (x + 2), (x + 5))

(c) $6 = 15 + 4q - 20$ $6 - 15 = 4(q - 5)$
$p - 3t = 4q - 4t$ $6 - 3 \times 5 = 4(q - 5)$

$2\frac{3}{4}$ 3

M1 for correct substitution of p and t.
M1 for correct expansion of 4(q – t) oe (eg 4q – 20, 4q – 4t)
A1 11/4 or 2 ¾ or 2.75
or
M1 for correct substitution of p and t.
M1 for $\frac{p - 3t}{4} = q - t$ *oe*
A1 11/4 or 2 ¾ or 2.75

[7]

9. (a) 90 + 80 × 0.50 2

90 + 40

= £130

M1 for 90 + 80 × 0.50 or 9000 + 80 × 50 or 90 + 80 × 50
A1 for 130
SC B1 4090 or 490 or 94 or 13000 seen

(b) $90 + 0.5m$ 2

B1 for 0.5 m
B1 for 90 + "0.5m"
NB ignore £ signs

[4]

10. (a) –3,…, 1,…., …., 7 2

B2 for all values correct
(B1 for 2 values correct)

(b) 2

B2 cao for line between x = –1 and x = 4
B1 ft for 4 points correctly plotted ± 1 (2mm sq) or for a line with gradient 2 or for a line passing through (0, –1)

[4]

11. (a) $90 + 80 \times 0.50$

$90 + 40 = £130$ 2

M1 for 90 + 80 × 0.50 or 9000 + 80 × 50 or 90 + 80 × 50

A1 for 130

SC: B1 for 94 or 490 or 4090 or 13000 seen

(b) $90 + 0.5m$ 2

B1 for 0.5 m

B1 for 90 + "0.5m"

NB: Ignore any £ signs

(c) $240 = 90 + 0.5m$

$150 = 0.5m$ 3

$= 300$

M1 for 240 = "90 + 0.5m"

M1 for "0.5m"= 150

A1 for 300

Alternative

M1 for 240 – 90 or 150 seen

M1 for "150" × 2 oe

A1 for 300

[7]

12. (a) $2a + 4c$ 1

B1 2a+4c or 2(a +2c)

(b) $\frac{1}{2} \times \frac{1}{4} \times (3)^2 = \frac{1}{2} \times \frac{1}{4} \times 9 = 1.125$

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) $(y + 3)(y + 5)$ 2

B2 for fully correct
(B1 for $(y + a)(y + b)$ with one of $ab = 15$, $a + b = 8$)

[9]

13. (a) $v^2 = 6^2 + 2 \times 2.5 \times 9$

9 3

M1 for correct substitution giving $6^2 + 2 \times 2.5 \times 9$ or better
M1 (dep) for $\sqrt{"81"}$
A1 cao accept $\pm$ 9
[SC: B1 for answer of 81 if M0 scored]

(b) $v^2 - u^2 = 2as$

OR

$$\frac{v^2}{2a} = \frac{u^2}{2a} + s$$

$\frac{v^2 - u^2}{2a}$ oe 2

B2 for $\frac{v^2 - u^2}{2a}$ oe

(B1 for $v^2 - u^2 = 2as$ oe or $\frac{v^2}{2a} = \frac{u}{2a} + s$ oe)

Examples:

$s = \frac{v^2 - u^2}{2} \div a$ *gets B2* $s = \frac{v^2 + u^2}{2a}$ *gets B1*

$s = v^2 - u^2 - 2a$ without the intermediate $2as = v^2 - u^2$ gets B0

[5]

14. (a) $1.8 \times -8 + 32$
17.6 — 2

M1 for 1.8×-8 or -14.4 or $\frac{-72}{5}$ seen or $32 - $ '1.8×8' or $1.8 \times -8 + 32$ seen
A1 for 17.6 or $\frac{88}{5}$ or 17.60 oe

(b) $68 = 1.8C + 32$
$1.8C = 68 - 32$
$C = 36 \div 1.8$
20 — 2

M1 for $68 - 32$ or 36 or $68 = 1.8C + 32$ seen; condone replacement of C by another letter.
A1 for 20 cao
NB Trial and improvement score 0 or 2

[4]

15. (a) $50 = 4k - 10$
$4k = 60$
15 — 2

M1for $50 = 4k - 10$ oe
A1 cao

(b) $y = 4 \times 2 - 3 \times 5$
-7 2

M1 for $4 \times 2 - 3 \times 5$ oe
A1 cao

[4]

16. (a) -7 2

$T = -15 + 8$

M1 for $5 \times -3 + 2 \times 4$ or better
A1 cao

(b) -9.5 oe 3

$16 = 35 + 2y$
$2y = -19$

M1 for $16 = 5 \times 7 + 2y$ or better
M1 for $2y = 16 -$ "35"
A1 cao

[5]

17. 21 2

$(-3)^2 - 4 \times -3$

M1 for $(-3)^2 - 4 \times -3$
A1 cao

[2]

18. 36 2

$(-4)^2 - 5(-4) = 16 + 20$

B1 for 16 or 20 seen (no negative signs)
B1 cao

[2]

19. 60 2

$25 + 35$

M1 for $(-5)^2 - 7 \times -5$ or $25 + 35$ (condone one error of sign)
A1 cao

[2]

20. 15 2

9 + 6

M1 for $(-3)^2 - 2 \times -3$ *(condone one incorrect sign)*
A1 cao

[2]

21. –26 2

C = 2 × –3 – 5 × 4 = –6 –20

M1 for correct substitution into 2p <u>*and*</u> *5q or –6* <u>*and*</u> *20 seen*
A1 cao

[2]

22. 2 × 25 + 3
53 2

B2
(B1 for 25 or ±50 seen)

[2]

23. (a) 12.7 1

B1 for 12.7 or $12\frac{7}{10}$

(b) 3 × –4 + 5 × 6
= –12 + 30
18 2

M1 for 3 × –4 or –12 ***AND*** *5 × 6 or 30 seen*
A1 cao

[3]

1. **Paper 1**

Very few candidates had the algebraic skills to tackle successfully either part of this question. Some were so suspicious of question setters that, in part (a), they answered that neither Tayub nor Bryani was right.

Paper 3

The choice between Tayub and Bryani was evenly split, but in both cases full explanations were usually given. It was disappointing to see a significant number of able candidates gaining full marks in part (a), to then make a common error in part (b) of calculating $(4(x + 1))^2$. Overall correct answers to part (b) were rare, with 169 a common incorrect answer.

2. This question was answered very poorly. The arithmetic required in part (a) proved too difficult for most candidates. Although more than 40% of candidates correctly substituted the values into the formula only 2% were able to evaluate it correctly. Some candidates could not work out 20 × 1.2 but the majority had problems with 5×1.2^2. Squaring 1.2 very often led to 2.4 and 5×1.2^2 was frequently confused with $(5 \times 1.2)^2$. Only 10% of candidates gained any marks in part (b). Most of those who substituted the given values and wrote $50 = u \times 5 - 5 \times 5^2$ were unable to proceed correctly. Candidates were even less successful in part (c). Few attempted the rearrangement in two steps or used inverse operations. Many simply transposed *u* and *D* in the formula.

3. **Specification A**

Few candidates were successful in this question. The most common error was to ignore the negative sign and use 2.5 instead of –2.5, leading to an answer of 34.5.

Specification B

Many candidates substituted 2.5 instead of –2.5 or just ignored the negative sign after correct substitution; 34.5 was a common answer.

4. Responses to this question were very mixed. Many candidates picked up 1 mark for correct substitution. Several candidates lost marks immediately for substituting 7 rather than –7. A lot could not expand the brackets correctly or forgot to work out the inside of the bracket first. Quite a few, who substituted correctly, proceeded to add 2 instead of multiplying by 2. There were few correct answers of –5 , some got to 5 but forgot the – sign.

5. The first part of this question was well answered with the great majority of candidates scoring both marks. Candidates scoring no marks in this part had usually failed to add the £50 and gave an answer of £105.

Little working was shown in the working space for part (b) so candidates usually scored either 3 marks or 0 marks. Of those who gained no marks, many had given either 5 or 7 as their answer. Those candidates might have scored some marks for method had they tried to write it down on paper. Of those candidates who employed a method involving repeated addition very few were successful, usually again because they failed to take account of the £50.

Part (c) discriminated well between candidates who had some grasp of how to construct an algebraic formula at this level and those who didn’t. Whilst candidates who gave a linear expression in h gained some credit there were many candidates whose answers included the term “p x h”. Only rarely did candidates gain all the marks available here. A considerable number of candidates made no attempt at this part of the question.

6. Most candidates carried out the fairly straightforward substitution in part (a) with few mistakes. The only slips seen regularly were $3 \times 3 = 6$ and $4 \times 2 = 6$. Some candidates, though, took $3x$ and $4y$ to be 33 and 42 respectively. The substitution in part (b) proved more challenging. It was often done in stages and comparatively few candidates could deal with $-7 - 3$. This was often evaluated as 10, –4 or 4. It would appear that many candidates had learnt the rule "two minuses make a plus" without learning when it is applicable. Those whose first step was to expand the bracket often did this incorrectly and $2(-7 - 3) = 2 \times -7 - 3 = -14 - 3$ was frequently seen. Substituting 7 instead of –7 was all too common, suggesting that some candidates were careless in reading the question.

7. In part (a) many candidates fully understood the processes required in working backwards, and fully completed this question. Common errors included correct evaluations of (260-50)/35 with the addition of 1 to the answer, or the division of 260 by 35 as their first step. Some trial and improvement methods were seen, which gained no credit unless successful. It was disappointing to see some candidates leave unrealistic answers for marking, without realising they must be wrong. In contrast part (b) resulted in few fully correct answers. A few got P and h mixed up, and some gave the equation in the form h=. There were ambiguous answers with poor algebra, and some who gave their answer as an expression rather than a formula.

8. In part (a) many were able to gain the first mark for expanding the brackets. Combining terms with negative signs led to problems for many, with many incorrect simplifications. A significant minority spoiled an otherwise correct answer by further incorrect simplification. In part (b) only a minority arrived at the correct answer. The most common incorrect approaches resulted in either $(x+3)(x+4)$, or a partial factorising such as $x(x+7)+10$. In part (c) substitution of values into the equations normally result in a mark being awarded, but award of marks from that point on was rare. Unlike question 11(b), here expansion of the bracket was usually done incorrectly, and manipulation of other terms poor, even though by this stage most of the terms were numeric. Most did not follow the correct order of operations necessary and added the 15 to 4 before attempting to expand. A few attempted to find the answer by trial and improvement but this was rarely successful.

9. Candidates struggled with this question and there were hardly any correct solutions to part (b) where candidates had to write a formula from a set of instructions though about 10% of candidates gained some marks in part (a) where candidates had to use information in a word formula.

10. Many candidates were able to gain 1 mark in part (a) when they worked out two of the values in the table and a further 1 mark if they plotted 4 of their points correctly but fully correct solutions were rare.

11. In part (a) most candidates realised that they needed to multiply 50p by 80 and add the result to £90. Many, though, made errors in the multiplication or in the conversion to pounds and some did not attempt to convert pence into pounds. Therefore 94, 490 and 4090 were common incorrect answers. A small number of candidates multiplied 90 by 80 as well. Disappointingly, very few candidates obtained the correct formula in part (b) as most were unable to deal with the different units. Many gave an answer of $90 + 50m$. Others ignored the 50p and gave $90 + m$. It was common for candidates to include the £ sign in their formula and some included "p" as well. Some also included words, e.g. "*m* per mile". In part (c) hardly any candidates used their equation from part (b) and the majority began by subtracting 90 from 240. The second stage in the calculation defeated most and a very common error was to ignore the different units and divide 150 by 50. An answer, however unreasonable, of 3 miles was quite common. Those who appreciated that 50p is £0.50 often divided 150 by 2.

12. 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' $y(y + 8) + 15$

13. Substitution of the values of the three variables was usually good in part (a) but subsequent calculation was not. 6^2 was often seen evaluated as 12, $2 \times 2.5 \times 9$ seen was often followed by 5×18. Another very common mistake was to work out $2 \times (2.5 + 9)$.

On the occasions when the arithmetic was more accurate, some candidates failed to realise the need to find the square root, giving 81 as their answer, and some simply divided 81 by 2 as their attempt to solve $v^2 = 81$

Many candidates, in part (b), failed to understand the demand of the question and used information from part (a) to attempt a solution.

Those candidates using 'input' and 'output' machines often made errors either when dealing with the coefficient of s; separating the 2 and a incorrectly, or in the order of operations.

14. Specification A

Foundation

Many candidates struggled with the algebra in this question. Many attempts at substitution were spoilt by incorrect use of operations (eg 1.8 + –8 in part (a)) or incorrect transcribing of negative values. In part (b) few gained a mark for substitution by not writing the full equation; though some got as far as stating the 36. Many answers showed no working in either part.

Higher

Substitution of values into the formula was generally correct.

Subsequent errors with evaluation usually involved the -8 term where candidates often added 1.8 and -8 rather that multiplying them to give –6.2 and a final answer of 25.8 or ignored the negative sign to evaluate –8 × 1.8 as +14.4 and get 46.4 Often the operations were incorrectly ordered to give 1.8 × (–8 + 32) = 43.2 and the decimal point in 1.8 was sometimes omitted. In part (b) as in part (a) correct substitutions were often seen although some candidates missed the mark available for this by going straight to an incorrect attempt to solve. Where errors occurred in subsequent algebraic manipulation, some went on to add 32 to 68 getting 100, which they then divided by 1.8 to get 55.5555…. Others divided 68 by 1.8 before subtracting 32.

The decimal point in 1.8 was again sometimes omitted giving 2 as a final answer after 36 = 18C. Another common error was to substitute 68 for C rather than F giving F = 1.8 × 68 + 32.

Specification B

Foundation

Using the temperature conversion formula proved to be somewhat challenging, especially as the value given for C was negative with over 60% of the candidates scoring no marks in both parts. The starting point of replacing C in the formula was rewarded but a misunderstanding crept in when it came to evaluating it. From 1.8 × –8 it was not unusual to see this given as –6.2, thus ignoring the fact that the two numbers needed to be multiplied together not subtracted. For part (b) the formula needed to be rearranged using the given value of F to find C. Those who managed to deal with this produced some elegant lines of working but the majority struggled to make any headway.

Higher

This formula involving negative numbers and decimals proved a challenge for many candidates. The main issue appeared with the interpretation of the expression obtained when –8 was substituted for C and then the expression written and interpreted as 1.8 – 8 + 32 = 25.8. It is probably no accident that those candidates who wrote 1.8 × –8 + 32 tended to show more success.

Part (b) also caused problems with the order of operations required to find the value of C. However many candidates did work out 68 – 32 rather than go for the division and so picked up the method mark and then the accuracy mark.

15. Although part (a) was well attempted the correct answer of 15 was perhaps not as common as might have been expected. Many of those who did not work out the correct answer gained one mark for substituting the value of P to get $50 = 4k – 10$ but then incorrectly manipulated the terms to get $4k = 50 – 10$. Thus 10 was the most common incorrect answer. Many candidates who gave an answer of 10 were unable to gain the first mark because they did not show the substitution. Some of those with a correct method failed to divide 60 by 4 correctly. In part (b) most candidates correctly substituted the given values. The majority went on to give the correct answer but some who wrote 8 – 15 gave the answer as 7 rather than –7.

16. The success rate varied greatly between centres and within centres. Many candidates understood the requirements of part (a) and got as far as –15 + 8 but then went on to give incorrect answers of 7 or 23 or –23. Other mistakes were made by candidates working out $5x$ and $2y$ separately and then failing to show their addition clearly, particularly when arithmetic errors had been made.
In part (b) correct substitution was often followed by an incorrect second step; ($16 = 5 \times 7 + 2y$) often leading to ($2y = 35 - 16$) . Many candidates used trial and improvement methods, which were usually unsuccessful.
In both parts to this question a significant number of candidates misunderstood the meaning of $5x$ and $2y$ taking them as $5 + x$ and $2 + y$.

17. It was rare to see a correct answer that had been derived from correct working in this question. The usual mistake came in the understanding of $(–3)^2$ which was often taken as $–3^2$. This then led to values for $(–3)^2$ of –9 or –6 or 6. Many candidates chose to work out the values of $(–3)^2$ and $4x –3$ separately and then add the two answers instead of subtracting. Another common error was to arrive at –9 –12 and then give an answer of +21, arguing that 'two minuses make a plus'; this received no marks.

18. If candidates got to 16 or 20 they were invariably negative. Very few correct answers were seen.

19. Again there were very few fully correct answers, many candidates gaining 1 mark only for correct substitution or the correct evaluation of one part only. $(–5)^2$ was often written as $–5^2$ and evaluated as –25 or "correctly" as +25. $7x$ was often taken as $7 + x$ and working of 25 – 7 – 5 was not uncommon. A few candidates wrote –25 –35 = 60 gaining no marks. 25 – 35, 25 + 35 and – 25 + 35 gained 1 mark thus condoning one error of sign.

20. Very few (12%) candidates gained full marks but many scored one, usually for correct substitution, eg $(-3)^2 - 2 \times -3$. The most common error was to evaluate $(-3)^2$ as –9; however one mark could be gained for –9 + 6 or 9 – 6 (condoning one error in sign). A significant number of candidates did not understand the meaning of –2Q, often taking this as –2 – 3.

21. There were many correct answers but obtaining – 6 – 20 was no guarantee of success, often leading to answers of 26, – 14 or 14. $2p$ was sometimes interpreted as 2 – 3 or $5q$ as 54. An answer of – 21 appeared regularly, the result of (2 – 3) – (5 × 4).

22. The algebraic substitution involved in this question appeared to stretch the mathematical talents of most candidates with only 5% scoring both marks or managing to gain a method mark. The value $2x^2$ with $x = -5$ caused the problem as might be expected. Firstly a misunderstanding that gave rise to the evaluation of $(2 \times -5)^2$ or, secondly, an inability to deal with the minus sign such that $(-5)^2 = -25$, were at the forefront of miscalculations. The correct answer of 53 appeared on the answer line without any working on a fair number of scripts, probably by the direct use of the calculator.

23. Part (a) was answered correctly by 96% of candidates. Candidates were less successful in part (b) despite having a calculator to assist them with their calculations. The most consistent error was to substitute the given values correctly and realize that the sum -12 + 30 had to be evaluated but then work this out incorrectly as 42. Weaker candidates were unable to cope with the substitution o a negative number and would either ignore it completely or else would omit the multiplication signs and attempt to evaluate 3 – 4 + 5 + 6 instead of the correct sum. A number of candidates showed no substitution and just wrote down the result of the multiplications; errors were often made the most frequent being 16 and 35