1. Find the value of $6a + 3c$ when $a = 2$ and $c = {}^{-}4$.

_____ [2]

2. The value of a car £V is given by

$$V = 20\,000 \times 0.9^{t}$$

where t is the age of the car in complete years.

What is the value of V when $t = 3$?

(b) £ _____ [2]

3. Six equations are shown below, each labelled with a letter.

A	B	C
$y = -6x$	$x = \frac{1}{6}y$	$y = \frac{-3}{x}$

D	E	F
$x = \frac{6}{y}$	$y = 6x$	$y = \frac{2}{x} + 2$

Choose from the letters above to make this statement true.

Equation **B** and equation _____ are equivalent.

[1]

4(a). In this row of boxes, you start with 5 and 7.

5	7			

You add 5 and 7 to get 12 to go in the third box.
You add 7 and 12 to get 19 to go in the fourth box.
You add 12 and 19 to get 31 to go in the fifth box.

5	7	12	19	31

Complete these rows of boxes using the rule shown above.

4	6			

[1]

(b).

			34	55

[2]

(c). Complete this row of boxes, writing your expressions in their simplest form.

a	b			

[2]

(d). Use your answer to **(c)** to help you fill in the missing numbers in this row of boxes.

6				57

[3]

5.

(i) Find the value of t when $g = 4$ and $h = 7$.

$t = 12g - 5h$

(i) $t =$ _____ [2]

(ii) Rearrange to make r the subject.

$4r - p = q$

(ii) _____ [2]

6(a). Work out the value of $3x + 5y$ when $x = 7$ and $y = 6$.

_____

[2]

(b). A company charges £20 per day to hire a car plus 50 pence for each mile travelled.
Samira hired a car at these rates, for 3 days. She travelled 420 miles.

How much did it cost her to hire the car?

£_____

[3]

7. Find the value of $3a^2$ when $a = 4$.

_____

[1]

8(a). *Manton Inn* has this formula for the total cost, £P, for room hire and a meal for n people.

$P = 48 + 12n$

Find the total cost at *Manton Inn* for room hire and a meal for 25 people.

£ _____

[2]

(b). *Carney Hotel* charges £20 for the hire of the room and £16 per person for a meal.

Write a formula for the total cost, £C, of room hire and a meal for n people at this hotel.

_____

[2]

(c). Write an equation in terms of n for which the total cost at *Carney Hotel* and *Manton Inn* is the same.
Solve this equation to find n.

---

[3]

9. Write an expression for the total cost of 4 chocolate bars at c pence each.

_____ pence [1]

10. Write an expression for the total cost in pence of two doughnuts at d pence each and three teacakes at t pence each.

_____ p [1]

11. Work out the value of $x^2 + 3x$ when $x = 5$.

_____ [1]

12. Work out the value of $2x^3$ when $x = 5$.

(b) _____ [1]

13. Work out the value of $5g + 3h$ when $g = 7$ and $h = 4$.

_____ [2]

14. Work out the value of $2m - 4n$ when $m = 1.8$ and $n = -0.7$.

_____ [2]

15. * Rearrange this formula to make t the subject.

$v = 5t + 20$

_____ [2]

16. Show by substitution that $x = \frac{1}{2}$ is **not** the solution to the equation $2(3x - 1) = 7$.

_____

_____ [1]

17(a). Use the formula $B = \frac{n}{5}$ to find B when $n = 45$.

_____ [1]

(b). Use the formula $K = 2g - 3h$ to find K when $g = 7$ and $h = 4$.

_____ [2]

18.

Rearrange the equation to make x the subject.

$y = 7x - 3$

$x =$ _____ [2]

19(a)

. Find the value of $3a + 2b$ when $a = 16$ and $b = 7$.

_____ [2]

(b). Use the formula

$$v = u + at$$

to find the final velocity, when

- the initial velocity is 2 m/s
- the acceleration is 1.5 m/s^2
- the time is 6 seconds.

_____ m/s [2]

(c). Make d the subject of this formula.

$$c = 7d$$

_____ [1]

20(a) . Find the value of $10h + 6t$ when $h = 12$ and $t = 4$.

---------- [2]

(b). Rearrange this formula to make d the subject.

$e = f - 7d$

---------- [2]

END OF QUESTION PAPER

Question			Answer/Indicative content	Marks	Part marks and guidance	
1			0	2	**M1** for $3c = -12$ soi **Examiner's Comments** Was correct roughly half the time, and many candidates who did not score both marks at least earned the method mark for –12 seen. The answer was sometimes left as 12 + –12, although this became 24 or 144 on occasions.	eg implied by $3c = -12c$
			Total	**2**		
2			£14 580 or £14 600	2	**M1** for $20\,000 \times 0.9^3$	
			Total	**2**		
3			E	1		
			Total	**1**		
4	a		10, 16, 26	1		
	b		8, 13, 21	2	**M1** for one correct subtraction of two boxes	
	c		$a + b$, $a + 2b$, $2a + 3b$	2	**M1** for two expressions correct	
	d		15, 21, 36	3	**M1** for *their* '$2a + 3b$' = 57 **M1** for substituting $a = 6$ into *their* final expression and solving for b	
			Total	**8**		
5		i	13	2	**M1** for $12 \times 4 - 5 \times 7$ or better	
		ii	$r = \frac{p+q}{4}$	2	**M1** for $4r = p + q$	Allow correct equivalents of $\frac{p+q}{4}$
			Total	**4**		

Question			Answer/Indicative content	Marks	Part marks and guidance	
6	a		51	2	**M1** for 21 [from 3 × 7] seen or 30 [from 5 × 6] seen	Do not accept eg 21× for M1 Examiner's Comments Some left their answer unfinished as 21 + 30 or calculated 21 and 30 but then showed 21*x* and 30*y* on the answer line. Others added the 3 and 7 or created 37 and 56 giving an answer of 93.
	b		270	3	**M1** for [£]60 [from 3 × 20] seen **and** **B1** for [£]210 or 21000p seen Or **M1** for 420 × [0].5[0] oe soi	Accept equivalent answer in pence (clearly identified) Working in pounds Examiner's Comments £60 was usually seen and most realised the need to multiply 420 by 50 or 0.5. Calculating 420 lots of 50p caused errors for many. There was great confusion with units and working in a combination of pounds and pence led to many unrealistic answers; as a consequence, due to insecure knowledge of place value, there were several candidates who gained 1 or 2 rather than 3 marks.
			Total	5		

Question			Answer/Indicative content	Marks	Part marks and guidance	
7			48	1		Examiner's Comments This question on substitution and expanding brackets had a mixed response. Many candidates were successful, but a common error for less able candidates was to give the answer 144 from $(3 \times 4)^2$ or 1156 from 34^2.
			Total	1		

Question			Answer/Indicative content	Marks	Part marks and guidance	
8	a		348	2	**M1** for 48 + 12 × 25 **Examiner's Comments** A number of candidates coped successfully with the algebra, but the majority failed to give a correct response. It was rare to award M1 as candidates who showed this level of understanding generally went on to a correct answer. A very common wrong answer was 1500 from adding the 48 and 12 and then multiplying by 25.	Common
	b		$C = 20 + 16n$ as final answer	2	**M1** for $16n$ isw condone P instead of C **Examiner's Comments** Candidates coped somewhat better and many correct answers were seen. Errors seen included $20C + 16n$, $C = 36 + n$ and $36n$.	Condone poor notation such as $n16$ etc ; condone inclusion of £ Common
	c		$48 + 12n =$ *their* $(20 + 16n)$	M1 FT	must see this equation or simultaneous equations in C or P and n and	Common
			7 cao	2	subtracting **M1** for $28 = 4n$ or FT provided their (b) is of form $a + bn$ with both a and b non-zero	the correct answer without an equation can earn 2 marks only (eg from trials); ignore inclusion of £ anywhere
			or, for those attempting simultaneous equations in C or P and n and eliminating n:	or	allow **M0 SC1** for $328 = 16n$ or FT after 348 or *their* (a) = *their* $(20 + 16n)$	

Question			Answer/Indicative content	Marks	Part marks and guidance	
			multiplying to eliminate n and subtracting, with at most one error	M1	eg $16P = 768 + 192n$ and $12P = 240 + 192n$ then $4P = 528$ or, eg	bod **M1** if using both P and C but treating as same in multiplying etc
			7 cao	2	$4C = 192 + 48n$ and $3C = 60 + 48n$ then $C = 132$, with at most one error **M1** FT for obtaining cost [132 if correct] **and** reaching *their* cost – 20 = $16n$ or *their* cost – 48 = $12n$ **Examiner's Comments** The majority of candidates did not attempt this question. It was extremely rare to see a valid attempt to equate the two expressions. There was a wide variety of spurious working, often abandoned part way through. Candidates mainly wrote the two equations separately and attempted to solve each one for a variety of values of P and C, or added various elements from each one.	
			Total	**7**		
9			$4c$ or $c + c + c + c$ or $4 \times c$ oe	1	Need not be simplified **Examiner's Comments** This question proved to be difficult for most candidates. The correct answer of $4c$ was often "decorated" with extra symbols such as t for total cost.	**1** for tc (total cost) = $4c$ oe **1** for 4b = $4c$ with b described as choc bar **0** for $4c$ = 20p oe **0** for 4^c
			Total	**1**		

Question			Answer/Indicative content	Marks	Part marks and guidance	
10			$2d + 3t$ oe	1	**Examiner's Comments** Whilst a majority of candidates scored the mark in this part, many spoiled their correct result by further work with final answers such as $5dt$. $d^2 + t^3$ being often seen.	Condone $2dp + 3tp$ Ignore cost= or tc= or c= before or after expression Incorrect simplification e.g. $6dt$ scores 0
			Total	1		
11			40	1	**Examiner's Comments** This part was answered well. Some gave answers of 25 or 28 after mis-calcuating the squared term or not substituting $x = 5$ into $3x$ as well as x^2.	
			Total	1		
12			250	1	**Examiner's Comments** This was answered well by many. Others did not appreciate the order of operations for the calculation and gave an answer of 1000.	
			Total	1		

Question			Answer/Indicative content	Marks	Part marks and guidance	
13			47	2	**B1** for [5 × 7 =]35 or [3 × 4 =]12 or **M1** for 5 ×7 or 3 × 4 **Examiner's Comments** If 35 and 12 were seen, they were usually added correctly but there were two big errors here. The first was a large minority giving the answer 91 (from 57 + 34) showing misunderstanding of substitution into an algebraic expression and the other was to leave *g* and *h* in their final answer e.g. 35*g* + 12*h*.	
			Total	**2**		
14			6.4	2	**M1** for 2 × 1.8 – 4 × –0.7 or for 3.6 or 2.8 or ⁻2.8 seen **Examiner's Comments** Substituting numbers in the algebraic expression was generally done well with a fair number of correct responses. Some candidates had difficulties subtracting the negative number and consequently 0.8 was a common incorrect answer.	Accept any equivalent to 6.4 for 2 marks
			Total	**2**		

Question			Answer/Indicative content	Marks	Part marks and guidance	
15			$t = \frac{v-20}{5}$ with a complete correct method using appropriate algebraic form	2	Must have t = for 2 marks	
			1A Correct answer but method not complete or correct	1		
			1B Correct answer but not in an appropriate algebraic form			
			1C One full correct step shown (could follow an incorrect step FT)			
			1D Shows evidence of dividing by 5	0	eg this could be implied by dividing by $5t$	
			No appropriate method		**Examiner's Comments** To earn both marks on this QWC question candidates needed to show a full method with a correct solution using an appropriate algebraic form and only a few were able to do this. Of those that did show a correct solution, a well laid out flow chart with the reverse process clearly shown was a good way to demonstrate a full understanding of how to rearrange the formula. Those who tried to use a step by step approach nearly always made errors in 'balancing' their formula.	
			Total	**2**		

Question			Answer/Indicative content	Marks	Part marks and guidance	
16			Sub ½ in correct LHS of equation and get 1	1	oe Examiner's Comments It was rare to see the correct evaluation here. The vast majority did not follow the instruction to substitute $x = ½$ to arrive at a value of 1, but solved the equation instead.	
			Total	1		
17	a		9	1	mark final answer	
	b		2	2	mark final answer M1 for $2 \times 7 - 3 \times 4$ or 14 or 12 seen Examiner's Comments In parts (b) and (c) most candidates demonstrated that they understood the process of substituting into a formula and found correct answers.	look for incorrect working (2 + 7) – (3 + 4) = 2 or 9 – 7 = 2 are incorrect and score no marks
			Total	3		

Question			Answer/Indicative content	Marks	Part marks and guidance	
18			$\frac{y+3}{7}$ or $\frac{-y-3}{-7}$ final answer	2	M1 for $y + 3$ $= 7x$ or $\frac{y}{7} = x - \frac{3}{7}$ Or for correct FT completion to answer after incorrect first step has been shown For M1, accept the 'negative terms' versions **Examiner's Comments** Most candidates attempted (a), but responses were varied and there was confusion over the order in which to change the subject. Some made an incorrect first step, but then scored M1 for correct follow through to a completed answer. A number of candidates had made use of a vertical column and showed they knew the first step should be to add 7 to both sides, but then could not show working in equation form. Some students used flowcharts, but they often misinterpreted the second row. Many simply switched *x* and *y,* providing a final answer of $x = 7y - 3$. Part (b)(i) was generally well done although some candidates provided an extra *x* inside the bracket, giving their answer as $x(x - xy)$. Many (b)(ii) responses were incorrect, but a	

Question			Answer/Indicative content	Marks	Part marks and guidance	
					number contained two sets of brackets. M1 was awarded for $(x + 4)(x + 3)$. A common incorrect answer was $x(x + 8)$ + 12.	
			Total	2		

Question			Answer/Indicative content	Marks	Part marks and guidance	
19	a		62 cao	2	**B1** for 48 or 14 or **M1** for 3 × 16 + 2 × 7 **Examiner's Comment** This part was very often correct, although some candidates were not able to calculate 3 × 16 correctly. Many showed working and 1 mark for a reaching 48 and 14 could be awarded. Some did not add their values.	
	b		11 cao	2	**M1** for 2 + 6 ×1.5 If 0 scored **SC1** for answer –7 **Examiner's Comment** Candidates are expected to be able to use the formula in this part, yet success was limited with this part. Common errors were to correctly substitute values, but then carry out the operations in the incorrect order, to square the 1.5 (presumably through misunderstanding of its squared units, i.e. m/s^2) and to find *u* instead of *v*.	

Question			Answer/Indicative content	Marks	Part marks and guidance	
	c		$d = \frac{c}{7}$ oe	1	Accept d = $\frac{c}{7}$ or c ÷ 7 with no c ÷ 7 and $\frac{c}{7} = d$ subject scores 0 **Examiner's Comment** This part was not well done and candidates had little appreciation of the required processes. Common wrong answers were $d = 7c$, $d = c - 7$ and $d = \frac{7}{c}$.	
			Total	5		

Question			Answer/Indicative content	Marks	Part marks and guidance	
20	a		144	2	M1 for 120 or 24 or 10 × 12 + 6 × 4 | Not 120h or 24t Examiner's Comments There were many correct answers in part (b), with most evaluating both terms correctly. A small number of candidates arrived at 120 + 24, but unfortunately did not go on to find the total, others wrote $120h + 24t$ showing a lack of understanding.	
	b		$d = \frac{f-e}{7}$ oe nfww	2	M1 for correct first step $\frac{f-e}{7}$ or $\frac{f}{7} - \frac{e}{7}$ | $e + 7d = f$ or $e - f = -7d$ oe Examiner's Comments Few candidates were able to answer part (c), unfortunately it was often difficult to award any marks at all, because candidates often did not show the steps in their rearrangement.	
			Total	4		