

5x = 2x + 18



x = _____ [2]



x = _____ [3]

(i) 2*x* = 18

(i) *x* = _____ [1]

(ii) x + 2 = 5

(ii) *x* = _____ [1]

(iii) $\frac{x}{3} = 15$

(iii) *x* = _____ [1]

4(a). Solve.

$$3x^2 = 75$$

(b). Solve.

4x + 3y = 52x + 3y = 1 x = _____ [2]

x = _____ y = _____

[3]

5. Solve these equations.

(i)
$$\frac{x}{3} = 12$$

	(i) [1]
(ii) $5x = 17.5$	

(iii) 7x + 5 = -23

(iii) _____ [2]

(ii) _____ **[1]**

6. Solve these equations.

(i) y - 7 = 4

(i) _____ [1]

(ii) 2(3x-1) = 10x - 5

(ii) _____ [4]

7(a). Solve the equations to find each value of x.

(b).
$$\frac{x}{2} = 21$$

(c). 4x + 2 = 17

[1]

_____ [1]

F

(b).	$\frac{x}{4} = 24$		[1]
(c).	3x - 4 = 29		[1]
9.	Solve.		[2]
	(i) 3 <i>c</i> = 18		
	(ii) 7 <i>d</i> + 16 = 51	(i) <i>c</i> =	[1]
	(iii) $\frac{x}{100} - 14 = 36$	(ii) <i>d</i> =	[2]

(iii)) <i>x</i> =	_			_				_		_						_	_	_						_	[2	2]	
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(i)
$$\frac{x}{6} = 30$$

(i) _____ [1]

(ii) 6x + 1 = 16

(ii) _____ [2]

11. Simon is asked to solve an equation.

Here is his solution.

$$2(3x - 1) = 7$$

$$6x - 2 = 14$$

$$6x = 14 - 2$$

$$6x = 12$$

$$x = \frac{1}{2}$$

Simon has made three errors.

Explain the errors that he has made.

1
2
3
[3]



6	(b).	<u>x</u> 2= 13		x =	[1]
6	(c).	5 <i>x</i> + 4 = 34		<i>x</i> =	[1]
	13.	Solve.		<i>x</i> =	[2]
		(i) 3 <i>x</i> = 36			
		(ii) 13 = 4 + 6 <i>x</i>	(i	i)	[1]
			(ii	i) x =	[2]



14. Here is a number pyramid.

The value in each cell is found by adding the values in the two cells beneath it.



In the number pyramid below, find the value of *x*. Show all your working.



x = _____ [4]

15.

Solve by factorising.

$$x^2 + 10x + 21 = 0$$

x = _____ or *x* = _____ [3]



(i) 7*x* = 28

x = _____ [1]

(ii)
$$\frac{x}{3} - 2 = 9$$

x = _____ [2]

END OF QUESTION PAPER

OCR GCSE Maths - Algebraic Equations (F)

Q	uestio	n	Answer/Indicative content	Marks	Part marks and guidance					
1		i	[<i>c</i> =] 10	1						
		ii	[<i>f</i> =] –3	1						
		iii	[<i>g</i> =] 4	1	After 0+0+0 in (b), SC1 for 10 – 3 = 7 and –3 + 5 = 2 and 5 × 4 = 20					
					Examiner's Comments					
					The equations were generally well solved. Occasionally it was necessary to award SC1 for embedded answers, although this occurred less often than in previous sessions.					
			Total	1						
2	а		6	2	M1 for 3 <i>x</i> = 18					
	b		-3 -5	3	M2 for $(x + 3)(x + 5)$ seen or implied in table Or M1 for $(x \pm 3)(x \pm 5)$ seen or pair of factors giving two correct terms seen or implied in table And B1 for correct solutions FT <i>their</i> quadratic factors					
			Total	5						
3		i	9	1						
		ii	3	1						
		iii	45	1						
			Total	3						
4	а		[+]5 –5	2	M1 for $x^2 = 25$ If zero scored SC1 for 5 seen as answer					
	b		[x =] 2 [y =] -1	3	M1 for eliminating one variable M1 for correct substitution of <i>their x</i> or <i>y</i>					

Qı	uestio	n	Answer/Indicative content	Marks	Part marks and guidance					
			Total	5						
5		i	36	1		Throughout, accept answers embedded in original equation				
		ii	3.5 oe	1						
		iii	-4	2	M1 for $7x = -23 - 5$ or $23 + 5 = -7x$ or better	Examiner's Comments A few were unable to cope with the directed numbers in (iii) when doing ⁻ 23 – 5, but they often gained a method mark for showing this step in their working.				
			Total	4						

Qı	Question		Answer/Indicative content	Marks	Part marks a	nd guidance
6		i	11	1	Examiner's Comments Most candidates solved the first equation in part (i) and it was pleasing to see that there were fewer embedded answers, i.e. $11 - 7 = 4$.	
		ii	0.75	4	oe, nfww; isw wrong conversion after $\frac{3}{4}$ M1 for $6x - 2$ [= $10x - 5$] oe and M2 for 3 = $4x$ oe or FT or M1FT for collecting <i>x</i> s or numbers correctly FT on opposite sides of equation and M1FT for <i>their</i> final answer FT <i>their</i> $ax = b$, dep on at least M1 already earned, for $a \neq 0$ or 1 and $b \neq 0$ (isw wrong conversion) Examiner's Comments The equation in part (ii) though was only solved successfully by the best candidates. Whilst many scored the first mark for correctly removing the brackets, not so many went on to correctly gather either the <i>x</i> terms or the numbers. The minus sides on both sides of the equation seemed to prove difficult to deal with. Many candidates 'lost' the equation and wrote spurious expressions such as $3x - 1 = 2x$ and $10x - 5$ = $5x$.	for dealing with brackets correctly, or division by 2: [3x - 1 =] 5x - 2.5 oe award a max. of M3 if answer is not correct
			Total	5		

Qı	uestio	n	Answer/Indicative content	Marks	Part marks a	nd guidance
7	а		3.5 oe	1	Examiner's Comments Answered very well by most. Errors included answers of 12.5.	Allow correct embedded solution in original equation as final answer to score full marks.
	b		42	1	Examiner's Comments Answered very well by most. Errors included answers of 10.5.	Allow correct embedded solution in original equation as final answer to score full marks.
	С		3.75 oe	2	M1 for $4x = 17 - 2$ or FT their $ax = b$ with $a \neq 0$ or 1 or b and $b \neq 0$ Examiner's Comments Answered very well by most. A few attempted trial and improvement techniques to solve the equation and usually could not arrive at 3.75.	Allow FT at division step isw – does not need to be evaluated If division step not shown, accept answer correct to 2 sf or better Allow correct embedded solution in original equation as final answer to score full marks.
			Total	4		

Q	uestio	n	Answer/Indicative content	Marks	Part marks a	nd guidance
8	а		5.2 oe	1	Accept 26/5 isw	Accept embedded answers Examiner's Comments The equation was well answered by most candidates.
	b		96	1	Accept embedded answers Examiner's Comments The equation was well answered by most candidates. A common error was to give the answer 6 for part (b) by dividing by 4 rather than multiplying.	
	C		11	2	M1 for $3x = 29 + 4$ or $x - \frac{4}{3} = \frac{29}{3}$ Accept embedded answers Examiner's Comments This was worth 2 marks and was not well answered and many candidates went straight to an answer without showing a method step so part marks were not often awarded where the answer was incorrect. Candidates should be encouraged to record their answers as $x = \dots$ rather than embedding the solution within the original equation.	
			Total	4		

Q	uestio	n	Answer/Indicative content	Marks	Part marks a	nd guidance
9		i	6	1		
		ii	5	2	M1 7 <i>d</i> = 51- 16 or ft <i>d</i> = 'their 35'/7 Examiner's Comments Most candidates attempted (a) with many gaining 1 mark for 2 <i>j</i> but very few got 2k or even 2 <i>k</i> . Instead 10 <i>k</i> or 10k was frequently given. (b)(i) The vast majority of candidates answered this correctly. Many were able by inspection to know that the answer was 6. (ii)This part was well attempted but not as successfully as part (i). There was little evidence of algebra so awarding M1 was quite difficult. Candidates who used flow diagrams often failed to write their values at each step and therefore lost the M1 mark. Few candidates did not attempt this part.	Must be equation in <i>d</i>
		iii	5000	2	M1 for <i>x</i> /100 = 36 + 14 oe or ft <i>x</i> = <i>their</i> 50 × 100	Must be equation in <i>x</i>
			Total	5		

Q	uestio	n	Answer/Indicative content	Marks	Part marks a	nd guidance
10		i	180	1		Accept $\frac{180}{6} = 30$ as answer
		ii	2.5 oe	2	M1 for $6x = 16 - 1$ or better Examiner's Comments This was answered quite well. Many were successful in the first part of (b); the common error was to give the answer 5 from $30 \div 6$ rather than 30×6 . The second part was answered well; many candidates did not show the steps for this and simply gave a solution which is fine if it is correct. Candidates should note that solutions to equations should be stated clearly and not left embedded in the original equation.	Allow 15/6 isw for 2 marks Accept 6 × 2.5 + 1 = 16 as answer for 2 marks
			Total	3		

Que	estion	Answer/Indicative content	Marks	Part marks a	nd guidance
11		Shouldn't multiply 7 by 2 oe	1	Multiplied 7 by 2 (which is wrong)	Any order. Any correct statement, no contradiction.
		Should be 14 + 2 oe	1	He did 14 – 2 (which is wrong)	
		Should be 12 ÷ 6 oe	1	He did 6 ÷ 12 (which is wrong)	
				Examiner's Comments	
				There were mixed responses to this question. Candidates appeared not to know what was required as many solved the equation rather than looking for the errors in the given working. Expressing the errors also created problems for many. The very best candidates gave all three errors whilst others managed to see at least one. The common one that was seen was – 2 instead of + 2 in the third line. The division by 6 was not given that often, indicating that candidates thought that $x = \frac{1}{2}$ was a correct final step. Those that were successful usually said that the answer should be 2 not $\frac{1}{2}$ for that step. Candidates needed to be clear about the error and answers such as 'he did the brackets wrong' were too vague to score.	
		Total	3		

Question		n	Answer/Indicative content	Marks	Part marks and guidance		
12	а		67	1	Examiner's Comments Nearly all candidates demonstrated the skills needed to solve simple equations. A small number subtracted ten rather than adding, giving an incorrect answer of 47.		
	b		26	1	Examiner's Comments Some candidates divided by 2 rather than multiplying, giving an incorrect answer of 6.5.		
	C		6	2	M1 for $5x = 30$ soi or $5 \times 6 + 4 = 30$ seen AND M1 for $x = \frac{b}{a}$ after $ax = b$ seen max 1 mark if answer incorrect Examiner's Comments Most used a trial and improvement method or an inverse flow chart rather than an algebraic technique and were generally successful with these approaches.	5x = 30 can be implied by 34 – 4 = 30 seen or 30 seen in a flow diagram $a \neq 1$, $b \neq 0$	
			Total	4			

Question		n	Answer/Indicative content	Marks	Part marks and guidance	
13		i	12	1		
		ii	9 6 ⁰ e	2	M1 for a correct step eg $13 - 4 = 6x$ or $x = b/a$ after $ax = b(a \neq 1, b \neq 0)$ from <i>their</i> equation Examiner's Comments (i) was generally well answered, it was pleasing to see very few embedded answers. (ii) was less well done, several candidates got as far as $9 = 6x$. Several candidates then went on to give the correct answer whilst others divided by 9, again division proved a problem for several candidates.	
			Total	3		

Question		n	Answer/Indicative content	Marks	Part marks and guidance	
Qu 14	uestio	n	Answer/Indicative content 7.5 or 7 ½ oe	Marks 4	Part marks and M1 for $3 + x + 5$ or $2x + x + 5$ soi nfww M1 for $4x + 13$ [= 43] or better or <i>their</i> linear expression = 43 M1 for correct first step from <i>their</i> linear <i>equation</i> , eg $4x = 43 - 13$ or better M1 for $x = b/a$ after $ax = b$ ($a \neq 1, b \neq 0$) from <i>their</i> <i>equation</i> to a maximum of 3 marks Examiner's Comments This question was not designed for trial and improvement so those who used that method were not usually successful. They also did not make clear	4x + 13 [=43] implies the first M1 Their linear expression may not be simplified if you see trial-and- improvement then award M1 for each correct attempt, with input and output clearly linked, up to a maximum of 3 marks on the function 4x + 13 eg trial of 6 result 37 scores M1
					what their input and output numbers were, generally the work was a mass of numbers. Many failed to use algebra and write the correct expressions in the two blank cells and then form and solve an equation.	
			Total	4		

Question		n	Answer/Indicative content	Marks	Part marks and guidance		
15			–3 and –7	3	M2 for $(x + 3)$ and $(x + 7)$ ft their7)ft theirM1 for $(x + quadratica) and (x + factorsb) where abcondone= 21 or a + bomission ofb = 10final bracketB1 ft theirquadraticfactorsIf 0 scoredSC1 foranswer \pm 7and \pm 3$		
			Total	3			
16		i	4	1			
		ï	33	2	$M1 \text{ for } \frac{x}{3} = Alternative method M1 \text{ for } x - 6 = 27$ or $M1 \text{ for } x = a + b \text{ following } x - a = b$ $\frac{x}{b} = a$		
			Total	3			