



# Algebra Calculator

*Revision Pack*

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49 minutes



50 marks

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*To use alongside [mymaths.co.uk](http://mymaths.co.uk) and [livemaths.co.uk](http://livemaths.co.uk) to revise for your GCSE exam*

**Q1.** (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)**

**Q2.** The equation

$$x^3 + 2x = 26$$

has a solution between 2 and 3

Use a trial and improvement method to find this solution.  
Give your answer correct to one decimal place.  
You must show **all** your working.

$x = \dots\dots\dots$

**(Total 4 marks)**

**Q3.** Here are the first four terms of an arithmetic sequence.

5    8    11    14

Find an expression, in terms of  $n$ , for the  $n$ th term of the sequence.

$\dots\dots\dots$

**(Total 2 marks)**

**Q4.** (a) Solve  $2x = 10$

$x = \dots\dots\dots$  (1)

(b) Solve  $y - 3 = 8$

$y = \dots\dots\dots$  (1)

(c) Solve  $4t + 1 = 19$

$t = \dots\dots\dots$  (2)

(d) Solve  $4w + 8 = 2w + 7$

$w = \dots\dots\dots$  (2)  
(Total 6 marks)

**Q5.** (a) Simplify  $t^6 \times t^2$

$\dots\dots\dots$  (1)

(b) Simplify  $\frac{m^8}{m^3}$

.....

(1)

(c) Simplify  $(2x)^3$

.....

(2)

(d) Simplify  $3a^2h \times 4a^5h^4$

.....

(2)

(Total 6 marks)

**Q6.** (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)

**Q7.** The equation

$$x^3 + 20x = 71$$

has a solution between 2 and 3

Use a trial and improvement method to find this solution.  
Give your answer correct to one decimal place.  
You must show **ALL** your working.

$x =$  .....

(Total 4 marks)

**Q8.** The  $n$ th term of a number sequence is  $n^2 + 1$

Write down the first three terms of the sequence.

.....

**(Total 2 marks)**

**Q9.**  $F = 1.8C + 32$

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

.....

**(2)**

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

.....

**(2)**

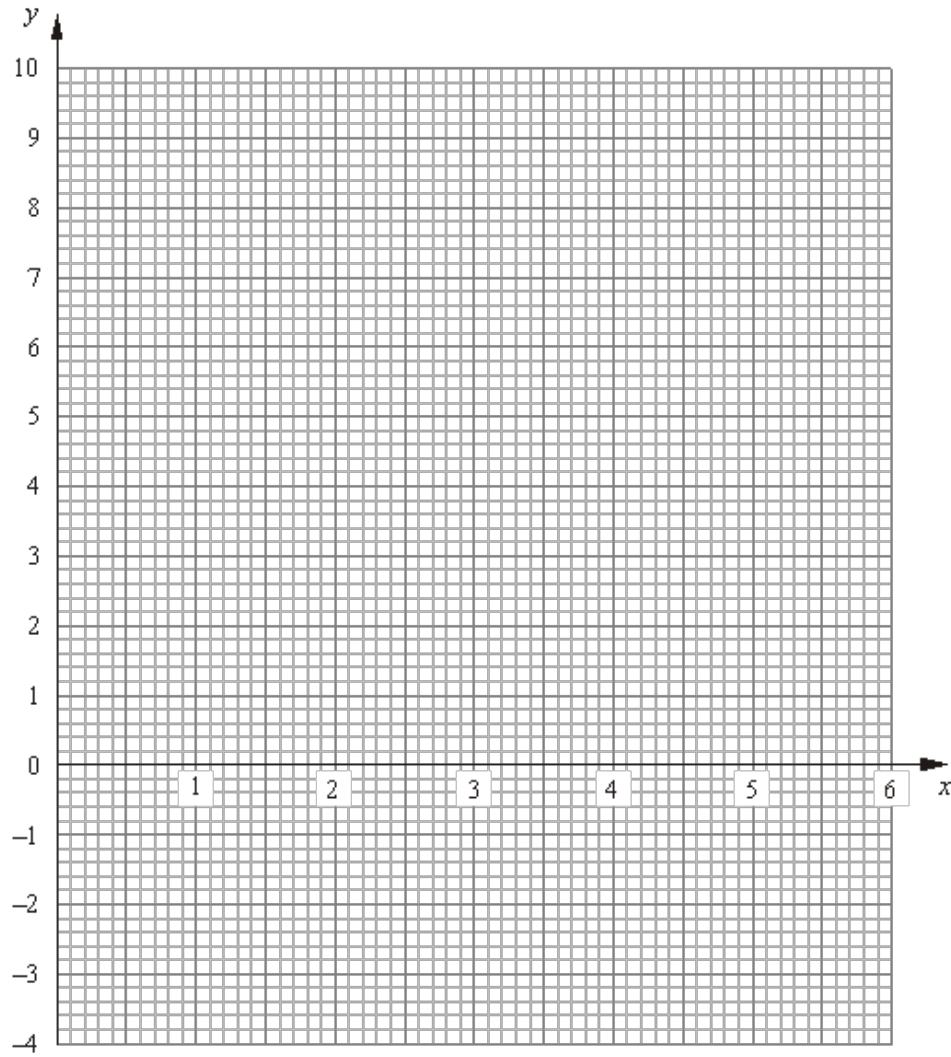
**(Total 4 marks)**

**Q10.** (a) Complete the table of values for  $y = x(x - 3)$  for values of  $x$  from 0 to 5.

$x$	0	1	2	3	4	5
$y$	0	-2		0	4	

**(1)**

(b) On the grid draw the graph of  $y = x^2 - 3x$



(2)

The length of a rectangle is 3 m less than the width. The area of the rectangle is  $7 \text{ m}^2$

(c) Find an estimate for the width of the rectangle.

..... m

(2)  
(Total 5 marks)



**M1.**

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

**M2.**

Working	Answer	Mark	Additional Guidance
$2 \rightarrow 12$ $3 \rightarrow 33$ $2.1 \rightarrow 13.(461)$ $2.2 \rightarrow 15.(048)$ $2.3 \rightarrow 16.(767)$ $2.4 \rightarrow 18.(624)$ $2.73 \rightarrow 25.8(06)$ $2.75 \rightarrow 26.2(96)$	2.7	4	<b>B2</b> for trial between 2.7 and 2.8 inclusive <b>(B1</b> for trial between 2 and 3 inclusive) <b>B1</b> for different trial between 2.73 and 2.75 inclusive <b>B1</b> (dep on at least one previous <b>B1</b> ) for 2.7 only NB trials where $x$ has 1 d.p should be rounded or truncated to at least 2SF; trials where $x$ has 2 d.p. or more should be rounded or truncated to at least 3SF
$2.5 \rightarrow 20.(625)$ $2.6 \rightarrow 22.(776)$ $2.7 \rightarrow 25.(083)$ $2.8 \rightarrow 27.(5(52)$ $2.9 \rightarrow 30.(189)$ <b>2.74 <math>\rightarrow</math> 26.0(508) or 26 <math>\leftarrow</math></b> $2.76 \rightarrow 26.5(45)$			
<b>Total for Question: 4 marks</b>			

**M3.**

Answer	Mark	Additional Guidance
$3n + 2$	2	<b>B2</b> for $3n + 2$ (oe, including un-simplified) <b>(B1</b> for $3n + k$ , $k \neq 2$ )
<b>Total for Question: 2 marks</b>		

**M4.**

	Working	Answer	Mark	Additional Guidance
(a)		5	1	<b>B1</b> cao
(b)		11	1	<b>B1</b> cao
(c)	$4t = 18$	4.5	2	<b>M1</b> for subtracting 1 from both sides (or dividing by 4) <b>A1</b> for 4.5 oe
(d)	$2w + 8 = 7$	$-\frac{1}{2}$	2	<b>M1</b> for an intention to take $2w$ from both sides or take 8 from both sides <b>A1</b> for $-\frac{1}{2}$ oe
<b>Total for Question: 6 marks</b>				

**M5.**

	Working	Answer	Mark	Additional Guidance
(a)	$t^{6+2}$	$t^8$	1	<b>B1</b> for $t^8$ or for $t^{6+2}$
(b)	$m^{8-3}$	$m^5$	1	<b>B1</b> for $m^5$ or for $m^{8-3}$
(c)	$2^3 \times x^3$	$8x^3$	2	<b>B2</b> for $8x^3$ cao ( <b>B1</b> for $ax^3$ , $a \neq 8$ or $2x \times 2x \times 2x$ or $8x^n$ $n \neq 0,3$ )
(d)	$3 \times 4 \times a^{2+5} \times h^{1+4}$	$12a^7h^5$	2	<b>B2</b> for $12a^7h^5$ ( <b>B1</b> for $12a^7h^n$ , $n \neq 0, 5$ or $12a^m h^5$ , $m \neq 0$ , $7$ or $ka^7h^5$ , or $3 \times 4 \times a^{2+5} \times h^{1+4}$ )
<b>Total for Question: 6 marks</b>				

**M6.**

	Working	Answer	Mark	Additional Guidance
(a)		$a^3$	1	<b>B1</b> for $a^3$ cao
(b)	$5 \times 3x - 5 \times 2$	$15x - 10$	1	<b>B1</b> for $15x - 10$ cao
(c)	$3y \times y + 3y \times 4$	$3y^2 + 12y$	2	<b>M1</b> 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 <b>A1</b> 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	<b>M1</b> for $2 \times x - 2 \times 4$ or $2x - 8$ or $3 \times x + 3 \times 2$ or $3x + 6$ <b>A1</b> for $5x - 2$ cao
(e)	$x^2 + 4x - 3x - 12$	$x^2 + x - 12$	2	<b>M1</b> 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 $x(x + 4) - 3(x + 4)$ <b>A1</b> for $x^2 + x - 12$ cao
<b>Total for Question: 8 marks</b>				

M7.

Working		Answer	Mark	Additional Guidance
2	48	2.6	4	<b>B2</b> for trial $2.6 \leq x \leq 2.7$ evaluated ( <b>B1</b> for trial $2 \leq x \leq 3$ evaluated)  <b>B1</b> for different trial $2.6 < x \leq 2.65$  <b>B1</b> (dep on at least one previous <b>B1</b> ) for 2.6  Values evaluated can be rounded or truncated, but to at least 2sf when $x$ has 1dp and 3sf when $x$ has 2dp  <b>NB</b> Allow 72 for evaluation using $x = 2.66$  <b>NB</b> No working scores no marks even if answer is correct
3	87			
2.5	65.(625)			
2.6	69.(576)			
2.7	73.(683)			
2.65	71.6(09)			
2.61	69.9(79)			
2.62	70.3(84)			
2.63	70.7(91)			
2.64	71.1(99)			
2.66	72.(021)			
2.67	72.4(34)			
2.68	72.8(48)			
2.69	73.2(65)			
				<b>Total for Question: 4 marks</b>

M8.

Working	Answer	Mark	Additional Guidance
$1^2 + 1$ $2^2 + 1$ $3^2 + 1$	2, 5, 10	2	<b>M1</b> for $1^2 + 1$ or $2^2 + 1$ or $3^2 + 1$ (but not $1^2 + 1$ , $2^2 + 2$ , $3^2 + 3$ ) <b>A1</b> for 2, 5, 10  SC: <b>B1</b> for 1, 2, 5 with or without working
			<b>Total for Question: 2 marks</b>

**M9.**

	<b>Working</b>	<b>Answer</b>	<b>Mark</b>	<b>Additional Guidance</b>
(a)	$1.8 \times -8 + 32$	17.6	2	<b>M1</b> for $1.8 \times -8$ or $-14.4$ or $\frac{-72}{5}$ seen or $32 - '1.8 \times 8'$ or $1.8 \times -8 + 32$ seen <b>A1</b> for $17.6$ or $\frac{88}{5}$ or $17.60$ oe
(b)	$68 = 1.8C + 32$ $1.8C = 68 - 32$ $C = 36 - 1.8$	20	2	<b>M1</b> for $68 - 32$ or $36$ or $68 = 1.8C + 32$ seen; condone replacement of C by another letter. <b>A1</b> for 20 cao NB Trial and improvement score 0 or 2
				<b>Total for Question: 4 marks</b>

**M10.**

	Working	Answer	Mark	Additional Guidance																										
(a)	0, -2, -2, 0, 4, 10	-2, 10	1	<b>B1</b> , B1 for each cao																										
(b)		Smooth curve	2	<b>B1</b> correct plot of their values <b>B1</b> smooth curve through their points providing at least 1 mark earned in (a)																										
(c)	Draws $y = 7$  <b>OR</b> T&I  <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Width</th> <th>Area</th> </tr> </thead> <tbody> <tr><td>4</td><td>4</td></tr> <tr><td>4.1</td><td>4.51</td></tr> <tr><td>4.2</td><td>5.04</td></tr> <tr><td>4.3</td><td>5.59</td></tr> <tr><td>4.4</td><td>6.16</td></tr> <tr><td>4.5</td><td>6.75</td></tr> <tr><td>4.6</td><td>7.36</td></tr> <tr><td>4.7</td><td>7.99</td></tr> <tr><td>4.8</td><td>8.64</td></tr> <tr><td>4.9</td><td>9.31</td></tr> <tr><td>5</td><td>10</td></tr> <tr><td>4.55</td><td>7.0525</td></tr> </tbody> </table>	Width	Area	4	4	4.1	4.51	4.2	5.04	4.3	5.59	4.4	6.16	4.5	6.75	4.6	7.36	4.7	7.99	4.8	8.64	4.9	9.31	5	10	4.55	7.0525	4.5	2	<b>M1</b> draw $y = 7$ <b>A1</b> 4.5 – 4.6 ft from graph  <b>OR</b> Uses T&I  <b>B2</b> 4.5 with $x^2 - 3x$ evaluated correctly at 4.5 and 4.6  (B1 Locates 'root' between 4 and 5 at least 2 evaluations or refers to table)
Width	Area																													
4	4																													
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