2.1 Algebra: Expressions and Formulae: 1-hour Pack

Calculator allowed · about 60 minutes

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 Write an expression for each statement below. Use n, m or p as shown.

(a) A number, n, add 5. **(1)**

(b) Multiply a number, m, by 3, then subtract 2. **(1)**

(c) Divide a number, p, by 4, then add 7. **(1)**

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2 Simplify each expression by collecting like terms.

(a) 3a + 5a **(1)**

(b) 9b - 4b **(1)**

(c) 4x + 3y + 2x + y **(2)**

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3 Expand -3(2a + 5).

(2)

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4 A taxi firm charges a call-out fee of £3 plus £2 for every mile travelled.

(a) Write a formula for the total cost C, in pounds, of a journey of m miles. **(1)**

(b) Find C when m = 7. **(2)**

5 Factorise each expression fully.

(a) $6x^2 + 9x$ **(2)**

(b) $8x^2 - 12x$ **(2)**

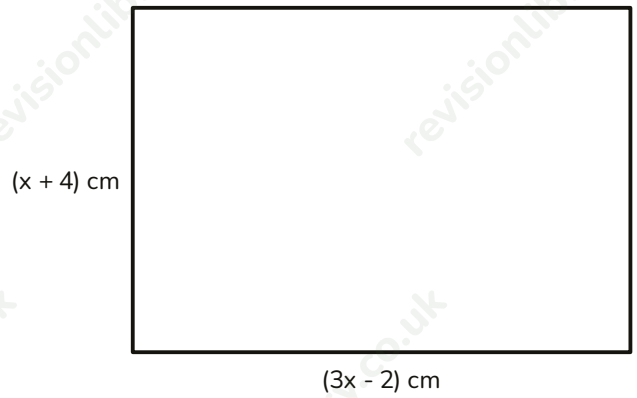
6 Rearrange each formula to make the stated letter the subject.

(a) Make x the subject of y = 3x + 2. **(2)**

(b) The formula for speed is v = u + at. Rearrange this formula to make a the subject. **(2)**

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7 A rectangle has length (3x - 2) cm and width (x + 4) cm.



(a) Write an expression, in its simplest form, for the perimeter of the rectangle. **(2)**

(b) Given that x = 5, find the numerical perimeter of the rectangle in cm. **(2)**

8 Simplify fully 5(2x + 3) - 2(x - 4). Then use your simplified expression to find its value when x = -3.

(4)

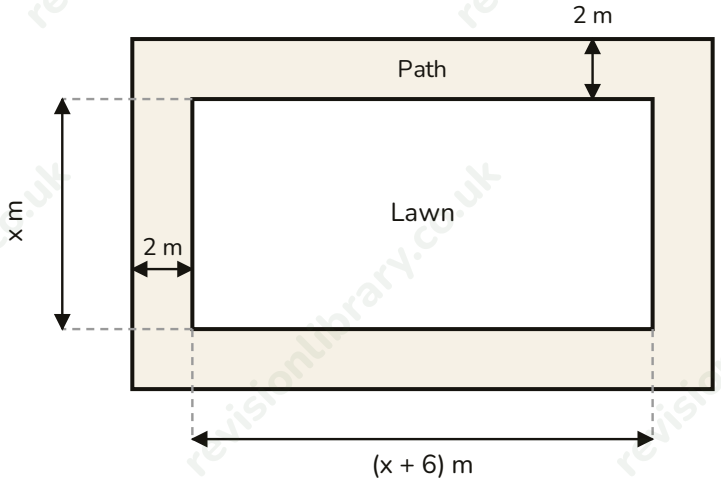
9 Show that $(n + 1)^2 - (n - 1)^2 = 4n$ for all values of n.

(3)

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10 A rectangular lawn has length (x + 6) m and width x m. A path of width 2 m is built all around the outside of the lawn.

Diagram NOT accurately drawn



(a) Write an expression, in its simplest form, for the area of the path. **(4)**

(b) Given that x = 8, find the area of the path in m^2. **(2)**

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11 Use the formula F = 9C/5 + 32
to work out the value of F when C = 15.

(3)

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12 Use the formula A = 1/2 bh
to work out the value of A when b = 8, h = 8.

(2)

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13 Expand t(2t + 9).

(2)

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14 Work out the value of $b^2 + 8$ when b = 6.

(2)

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Mark scheme · 2.1 Algebra: Expressions and Formulae: 1-hour Pack

A correct answer earns full marks unless the question asks for working, a method, proof or explanation.

Question 1

(a) n + 5 oe	B1
(a) Answer: **n + 5**	
(b) 3m - 2 oe	B1
(b) Answer: **3m - 2**	
(c) p/4 + 7 oe	B1
(c) Answer: **p/4 + 7**	

Question 2

(a) 8a cao	B1
(a) Answer: **8a**	
(b) 5b cao	B1
(b) Answer: **5b**	
(c) x terms and y terms grouped correctly, e.g. 4x+2x and 3y+y seen	M1
(c) 6x + 4y cao oe	A1
(c) Answer: **6x + 4y**	

Question 3

multiplies both terms by -3	M1
-6a - 15 cao	A1
Answer: **-6a - 15**	

Question 4

(a) C = 2m + 3 oe	B1
(a) Answer: **C = 2m + 3**	
(b) substitutes m = 7 into their formula	M1
(b) 17 cao	A1
(b) Answer: **17**	

Question 5

(a) 3x identified as the highest common factor	M1
(a) 3x(2x + 3) cao oe	A1
(a) Answer: **3x(2x + 3)**	
(b) 4x identified as the highest common factor	M1
(b) 4x(2x - 3) cao oe	A1
(b) Answer: **4x(2x - 3)**	

Question 6

(a) y - 2 = 3x, or equivalent correct first step	M1
(a) x = (y - 2)/3 cao oe	A1
(a) Answer: **x = (y - 2)/3**	
(b) v - u = at, or equivalent correct first step	M1
(b) a = (v - u)/t cao oe	A1
(b) Answer: **a = (v - u)/t**	

Question 7

(a) adds the four sides or doubles the sum of length and width	M1
(a) 8x + 4 cao	A1
(a) Answer: **8x + 4**	
(b) substitutes x = 5 into their perimeter expression	M1
(b) 44 cao	A1
(b) Answer: **44 cm**	

Question 8

expands both brackets correctly	M1
collects x terms and number terms	M1
8x + 23 cao	A1
-1 cao (ft their simplified expression)	B1
Answer: **8x + 23; value -1 when x = -3**	

Question 9

$(n+1)^2$ expanded correctly: $n^2 + 2n + 1$	M1
$(n-1)^2$ expanded correctly: $n^2 - 2n + 1$	M1
cso: fully correct simplification $(n^2+2n+1) - (n^2-2n+1) = 4n$ shown with no errors, answer printed	A1
Answer: **4n (shown)**	

Question 10

(a) outer length (x+10) and outer width (x+4) correctly found	M1
(a) outer area expanded correctly: $x^2 + 14x + 40$	M1
(a) lawn area $x^2 + 6x$ found and subtraction set up: $(x^2+14x+40) - (x^2+6x)$	M1
(a) 8x + 40 cao oe	A1
(a) Answer: **8x + 40**	
(b) 8(8) + 40 substituted, i.e. 64 + 40 seen	M1
(b) 104 m² cao	A1
(b) Answer: **104 m^2**	

Question 11

correct substitution into the formula	M1
correct order of operations when evaluating	M1
59 cao	A1
Answer: **59**	

Question 12

correct substitution into the formula	M1
32 cao	A1
Answer: **32**	

Question 13

one term correctly expanded	M1
$2t^2 + 9t$ cao	A1
Answer: **$2t^2 + 9t$**	

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Question 14

substitutes b = 6 correctly (brackets round negative numbers)	**M1**
44 cao	**A1**

Answer: **44**

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