2.1 Algebra: Expressions and Formulae: Test Pack

Calculator allowed · about 55 minutes

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 The expression 5x + 3y - 2 is shown. Answer the questions below about this expression.

(a) What is the coefficient of x in the expression 5x + 3y - 2? **(1)**

- ☐ A) 5
- ☐ B) 3
- ☐ C) x
- ☐ D) 2

(b) How many terms are there in the expression 5x + 3y - 2? **(1)**

- ☐ A) 2
- ☐ B) 3
- ☐ C) 4
- ☐ D) 5

(c) Which of the following is an expression rather than an equation? **(1)**

- ☐ A) 2x + 3 = 7
- ☐ B) 2x + 3
- ☐ C) 2x = 6
- ☐ D) x = 3

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2 x = 4 and y = 5.

(a) Find the value of 3x + 2y. **(2)**

.....

(b) Find the value of x^2 - y. **(2)**

.....

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3 Expand 3(2y - 4).

(2)

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4 x = 3 and y = 6.

(a) Find the value of 4x + 2y. **(1)**

.....

(b) Find the value of x^2 - y. **(1)**

.....

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5 A plumber, Priya, uses the formula C = 25h + 40 to work out her total charge, where C is the cost in pounds and h is the number of hours she works.

(a) Work out the cost, C, when Priya works for 3 hours. **(2)**

.....

(b) Priya charges a customer £190 for a job. Work out how many hours, h, she worked. **(2)**

.....

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6 Factorise fully 8x + 12.

(1)

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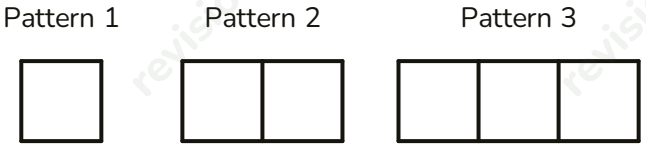
7 Simplify each expression fully.

(a) (6x + 9)/3 **(2)**

(b) (10y - 15)/5 **(1)**

---

8 A pattern is made from matchstick squares joined in a row. Pattern 1 has 4 matchsticks, pattern 2 has 7 matchsticks, and pattern 3 has 10 matchsticks.



(a) Find an expression, in terms of n, for the number of matchsticks in pattern n. **(2)**

(b) Use your formula to find the number of matchsticks in pattern 12, and state whether a pattern in this sequence could ever have exactly 100 matchsticks, giving a reason. **(3)**

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9 I think of a number, n. I add 2 and then multiply the result by 3. Write an expression for the result.

(2)

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10 Expand 8x(2x - 5).

(2)

---

11 Expand -2(4a + 6).

(2)

---

12 Work out the value of $3x^2$ when x = 8.

(2)

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13 Use the formula $s = ut + 1/2\ at^2$
to work out the value of s when u = 2, t = 2, a = 2.

(3)

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14 Use the formula A = 1/2 bh
to work out the value of A when b = 10, h = 5.

(2)

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15 Work out the value of 4 - 5x when x = -2.

(2)

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16 A rectangle has length d cm and its width is 9 cm shorter than its length. Write a formula for the perimeter, P cm.

(2)

17 Simplify $-2n^2 + 3n + 5n^2 - 6n + 2$.

(3)

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Mark scheme · 2.1 Algebra: Expressions and Formulae: Test Pack

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

Question 1

(a) A cao **B1**

(a) Answer: **A) 5**

(b) B cao **B1**

(b) Answer: **B) 3**

(c) B cao **B1**

(c) Answer: **B) 2x + 3**

Question 2

(a) 3 x 4 (=12) and 2 x 5 (=10) seen, or 12+10 seen **M1**

(a) 22 cao **A1**

(a) Answer: **22**

(b) 4^2 (=16) seen **M1**

(b) 11 cao **A1**

(b) Answer: **11**

Question 3

multiplies both terms by 3 **M1**

6y - 12 cao **A1**

Answer: **6y - 12**

Question 4

(a) 24 cao **B1**

(a) Answer: **24**

(b) 3 cao **B1**

(b) Answer: **3**

Question 5

(a) 25 x 3 (=75) seen, or 75 + 40 seen **M1**

(a) £115 cao **A1**

(a) Answer: **£115**

(b) 190 - 40 (=150) seen, or correct rearrangement 25h = 150 **M1**

(b) h = 6 cao **A1**

(b) Answer: **h = 6 hours**

Question 6

4(2x + 3) cao **B1**

Answer: **4(2x + 3)**

Question 7

(a) 6x/3 (=2x) and 9/3 (=3) both found, or 3(2x+3)/3 seen **M1**

(a) 2x + 3 cao oe **A1**

(a) Answer: **2x + 3**

(b) 2y - 3 cao oe **B1**

(b) Answer: **2y - 3**

Question 8

(a) common difference of 3 identified, e.g. 3n seen **M1**

(a) 3n + 1 cao oe **A1**

(a) Answer: **3n + 1**

(b) 3(12)+1 substituted correctly, i.e. 37 found **M1**

(b) 3n + 1 = 100 solved for n, i.e. n = 33 found (ft from part (a)) **M1**

(b) correct conclusion: yes, pattern 33 has exactly 100 matchsticks, since n=33 is a whole number (ft) **A1**

(b) Answer: **Pattern 12 has 37 matchsticks; yes, pattern 33 has exactly 100 matchsticks**

Question 9

one correct operation applied to the letter, eg a product or a sum **M1**

3(n + 2) oe cao **A1**

Answer: **3(n + 2)**

Question 10

one term correctly expanded **M1**

$16x^2$ - 40x cao **A1**

Answer: **$16x^2$ - 40x**

Question 11

one term correctly expanded **M1**

-8a - 12 cao **A1**

Answer: **-8a - 12**

Question 12

substitutes x = 8 correctly (brackets round negative numbers) **M1**

192 cao **A1**

Answer: **192**

Question 13

correct substitution into the formula **M1**

correct order of operations when evaluating **M1**

8 cao **A1**

Answer: **8**

Question 14

correct substitution into the formula **M1**

25 cao **A1**

Answer: **25**

Question 15

substitutes x = -2 correctly (brackets round negative numbers) **M1**

14 cao **A1**

Answer: **14**

Question 16

one correct term or a correct structure **M1**

P = 4d - 18 oe cao **A1**

Answer: **P = 4d - 18**

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Question 17

collects at least one pair of like terms correctly	**M1**
collects a second set of like terms correctly	**M1**
$3n^2 - 3n + 2$ cao	**A1**

Answer: **$3n^2 - 3n + 2$**

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