6.1 Introduction to Algebra: Test Pack

Total Marks

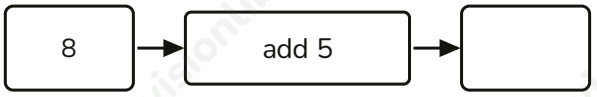
NCETM National Curriculum (2014) Mathematics - KS2 Algebra · Calculators not allowed · about 60 minutes

Name: _____ Date: ____ / ____ / _____

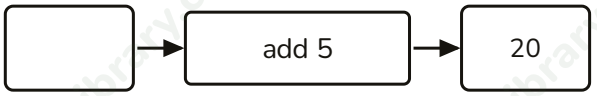
Answer ALL questions. Show all your working.

1 Look at the function machines. Each one shows an input, an operation and an output.

(a) Input: 8 -> add 5 -> Output: ? **(1)**



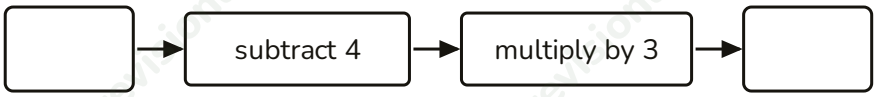
(b) Input: ? -> add 5 -> Output: 20 **(1)**



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2 A function machine subtracts 4, then multiplies by 3.

Diagram NOT accurately drawn



(a) Find the output when the input is 10. **(1)**

(b) Find the output when the input is 6. **(1)**

(c) The output is 30. Find the input. **(2)**

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3 Prove that the sum of any two consecutive whole numbers is always odd. Let the first whole number be n, so the next consecutive whole number is n + 1.

(3)

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4 The cost, C pounds, of hiring a bike for n hours is C = 3n + 16.

Work out C when n = 13.

Answer: £___

(2)

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5 Solve 8x - 19 = 61.

Answer: x = ___

(2)

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6 The table shows the position and term of a number pattern.
Position: 1, 2, 3, 4
Term: 4, 7, 10, 13

(a) Describe the term-to-term rule for this pattern. **(1)**

(b) Find the rule connecting the position number and the term. Write your rule using algebra, letting the position number be p. **(2)**

(c) Use your rule to find the 20th term. **(1)**

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7 Sam says: 'If you double a number and then add 3, the answer is always odd.' Is Sam correct? Explain your answer using at least one example.

(2)

---

8 Here is a sequence: 11, 15, 19, 23, 27, ...

The nth term is of the form 4n + b. Find the nth term.

Answer: ___

(2)

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9 The rule for a sequence is: start at 12 and add 2 each time. The 1st term is 12.

What is the 23rd term?

Answer: ___

(2)

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10 5 x ___ + 21 = 101

Answer: ___

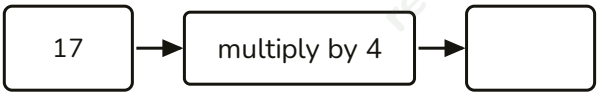
(2)

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11 A function machine multiplies by 4.

What is the output when the input is 17?

Answer: ___



(1)

---

12 Simplify 2x + 7x.

Answer: ___

(1)

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13 A sequence starts at 5 and increases by 4 each time.

(a) Write the first four terms of the sequence. **(1)**

(b) The nth term rule for this sequence is 4n + 1. Use the rule to find the 10th term. **(2)**

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14 Here is a sequence: 15, 18, 21, 24, 27, ...

Write the next two terms.

Answer: ___, ___

(2)

---

15 7 x ___ + 31 = 213

Answer: ___

(2)

---

16 A taxi charges £1 to start and £5 for each mile. A journey is y miles long.

Write an expression for the total cost in pounds.

Answer: ___

(2)

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17 Solve each equation to find the value of the letter.

(a) n + 8 = 15 **(1)**

.....

(b) m - 6 = 9 **(1)**

.....

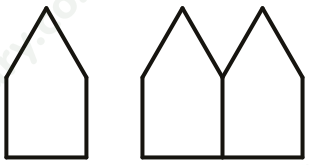
(c) 5p = 35 **(1)**

.....

18 Matchsticks are used to make a row of pentagons joined side by side. One pentagon uses 5 sticks and each extra pentagon added needs 4 more sticks.

How many sticks are needed for 11 pentagons?

Answer: ___



(2)

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19 Solve each two-step equation to find the value of the letter. Show your working.

(a) 3n + 2 = 17 **(2)**

(b) 2m - 5 = 11 **(2)**

20 ___ divided by 9 = 22

Answer: ___

(1)

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Mark scheme · 6.1 Introduction to Algebra: Test Pack

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

Question 1

(a) 13 cao — **B1**

(a) Answer: **13**

(b) 15 cao (accept use of the inverse operation) — **B1**

(b) Answer: **15**

Question 2

(a) 18 cao — **B1**

(a) Answer: **18**

(b) 6 cao — **B1**

(b) Answer: **6**

(c) 30 / 3 (= 10) seen, using the inverse operations in reverse order — **M1**

(c) 14 cao — **A1**

(c) Answer: **14**

Question 3

n + (n + 1) written oe — **M1**

simplifies to 2n + 1 — **A1**

correct reasoning that 2n is always even (a multiple of 2), so 2n + 1 is one more than an even number, which is always odd — **B1**

Answer: **n + (n + 1) = 2n + 1, which is always odd**

Question 4

3 x 13 seen — **M1**

£55 cao — **A1**

Answer: **£55**

Question 5

adds or divides first — **M1**

x = 10 cao — **A1**

Answer: **x = 10**

Question 6

(a) add 3 (each time) oe — **B1**

(a) Answer: **Add 3 each time**

(b) identifies 3 x p (or 3p) as part of the rule oe — **M1**

(b) term = 3p + 1 oe cao — **A1**

(b) Answer: **term = 3p + 1**

(c) 61 cao, ft their rule from part (b) — **B1**

(c) Answer: **61**

Question 7

states Sam is correct — **B1**

correct explanation with a valid example and reasoning, e.g. doubling any whole number always gives an even number, and an even number plus 3 (an odd number) always gives an odd number; example: double 5 = 10, 10 + 3 = 13, which is odd — **B1**

Answer: **Yes, Sam is correct**

Question 8

finds the common difference — **M1**

4n + 7 cao — **A1**

Answer: **4n + 7**

Question 9

22 steps of 2 seen — **M1**

56 cao — **A1**

Answer: **56**

Question 10

101 - 21 = 80 seen — **M1**

16 cao — **A1**

Answer: **16**

Question 11

68 cao — **B1**

Answer: **68**

Question 12

9x cao — **B1**

Answer: **9x**

Question 13

(a) 5, 9, 13, 17 all four correct cao — **B1**

(a) Answer: **5, 9, 13, 17**

(b) 4 x 10 (= 40) seen or implied — **M1**

(b) 41 cao — **A1**

(b) Answer: **41**

Question 14

identifies the rule — **M1**

30, 33 cao — **A1**

Answer: **30, 33**

Question 15

213 - 31 = 182 seen — **M1**

26 cao — **A1**

Answer: **26**

Question 16

one correct term — **M1**

5y + 1 cao — **A1**

Answer: **5y + 1**

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Question 17

(a) n = 7 cao **B1**

(a) Answer: **n = 7**

(b) m = 15 cao **B1**

(b) Answer: **m = 15**

(c) p = 7 cao **B1**

(c) Answer: **p = 7**

Question 18

10 extra shapes seen **M1**

45 cao **A1**

Answer: **45**

Question 19

(a) 3n = 15 oe (subtracts 2 from both sides) **M1**

(a) n = 5 cao **A1**

(a) Answer: **n = 5**

(b) 2m = 16 oe (adds 5 to both sides) **M1**

(b) m = 8 cao **A1**

(b) Answer: **m = 8**

Question 20

198 cao **B1**

Answer: **198**

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