1. Here is a pattern of number pairs.

a	b
1	9
2	19
3	29
4	39

Complete the **rule** for the number pattern.

$$b = \boxed{} \times a - \boxed{}$$

1 mark

2. $n = 22$

What is $2n + 9$?

$$\boxed{}$$

1 mark

$2q + 4 = 100$
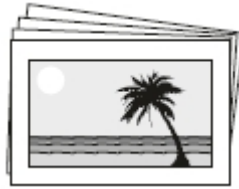
Work out the value of q.

$$q = \boxed{}$$

1 mark

3. Alfie has some photographs printed.

The cost is £2.50 for postage and 12 pence for each print.

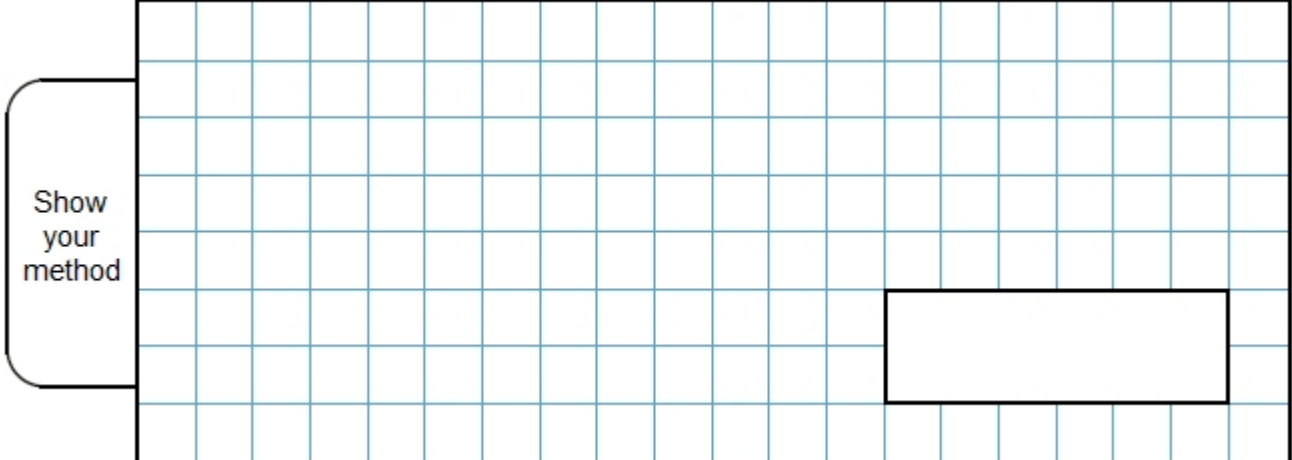Alfie uses this formula for the total cost (**C**) in pence.

$$C = 250 + 12n$$

n stands for the number of photographs.

The total cost for Alfie is **£6.70**

How many photographs does he have printed?

Show your method

2 marks

4.

(a) There are n counters in Alfie's bag.
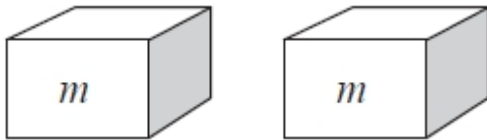
Alfie puts **3** more counters in the bag.

Write an expression for the number of counters that are in the bag now.

1 mark

(b) Megan has two boxes.

There are m counters in each box.

She puts all her counters together in a pile, then removes **5** of them.

Write an expression for the number of counters that are in the pile now.

1 mark

5.

x stands for an **odd** number.

y stands for an **even** number.

Look at the expressions below.

For each expression, tick to show if it is odd or even.

The first one is done for you.

	odd	even
$x + y$	✓	
$x + 2y$		
$2(x + y)$		
xy		
$x^2 + y$		

2 marks

6. Lisa is using trial and improvement to find a solution to this equation.

$$x^2 - 3x = 1$$

Here are her first few trials.

Complete the missing information.

When x = **3**, $x^2 - 3x$ = ____0____ , so this value of x is too __small__

When x = **4**, $x^2 - 3x$ = _____, so this value of x is too _____
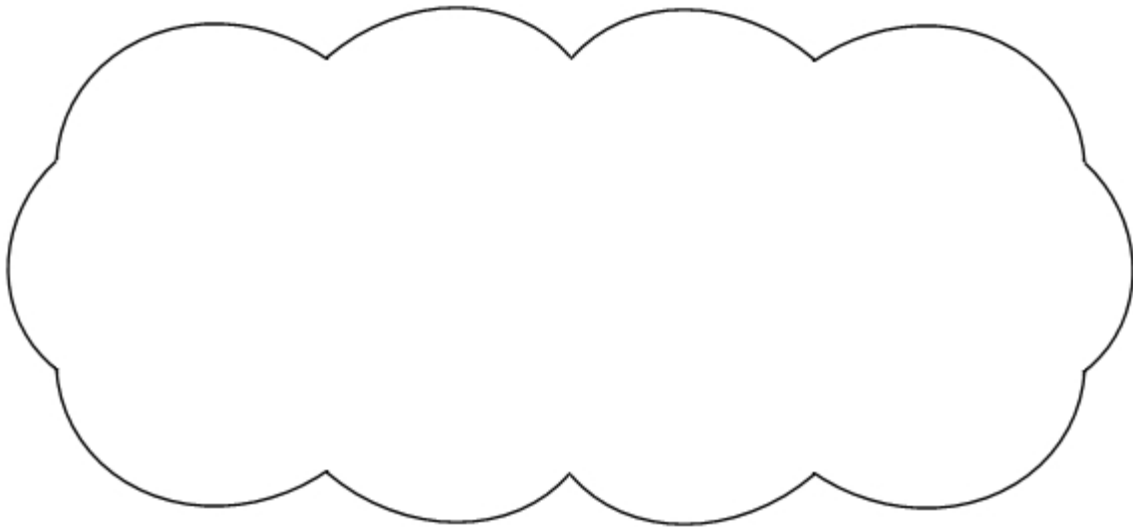
1 mark

When x = **3.5**, $x^2 - 3x$ = _____, so this value of x is too _____

1 mark

What value of x should Lisa try next?

$x =$_____

Explain why you chose that value.

1 mark

7. **p** and **q** each stand for whole numbers.

$$p + q = 1000$$

p is 150 **greater** than **q**.

Calculate the numbers **p** and **q**.

Show your method

p =

q =

2 marks

8. Ann makes a pattern of **L** shapes with sticks.
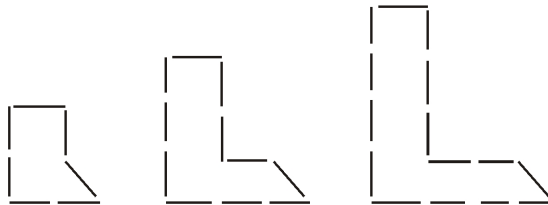
Shape–number:	1	2	3
Number of sticks:	7	11	15

Ann says :

"I find the number of sticks for a shape by first multiplying the shape–number by 4, then adding 3".

Work out the **number** of sticks for the shape that has shape-number **10**

1 mark

Ann uses **59 sticks** to make another **L** shape in this pattern.

What is its shape-number?

Show
your
method
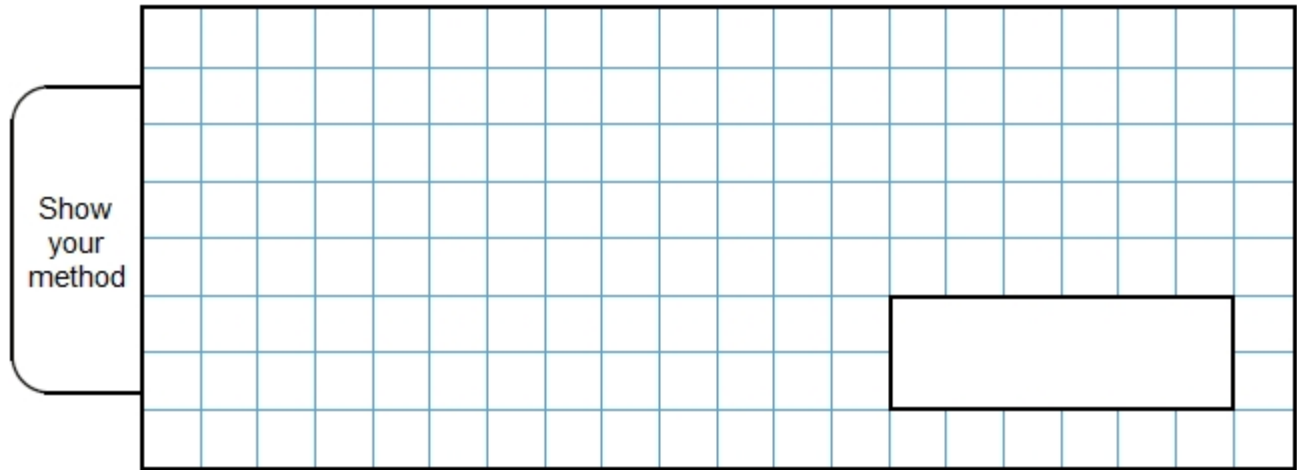
2 marks

Here is Ann's rule again:

"I find the number of sticks for a shape by first multiplying the shape–number by 4, then adding 3".

Write a formula to work out the number of sticks for any **L** shape.

Use **S** for the number of **sticks** and **N** for the **shape-number.**

S =

2 marks

9. Solve this equation to find the value of y.

$$8(y + 12) = 100$$

Show your method

$y =$

2 marks

10. Find the value of t in this equation.

$$33 - 8t = 15$$

Show your method

2 marks

11.

What is the value of u in this equation?

$$5u - 10 = u + 46$$

Show your method

2 mark

12.

The **sum** of two numbers is **5**

The **difference** between the numbers is **0.5**

What are the numbers?

Show your method

2 mark

13.

Find the value of x in this equation.

$$6x - 27 = 0$$

Show
your
method

2 marks

14.

Find the value of t in this equation.

$$4 + t = 9t$$

Show
your
method

2 marks

Mark schemes

1. Both numbers correct as shown:

$$b = \boxed{10} \times a - \boxed{1}$$

[1]

2. (a) 53

1

(b) 48

1

[2]

3. 35

2

or

Shows or implies a complete correct method, eg:

- $(670 - 250) \div 12$

- $670 = 250 + 12\,n$
  $12n = 670 - 250$
  $12n = 430$ (error)
  $n = 430 \div 12 = 25.8$ (error)

> *!   Inconsistent units*
>
> *Within an otherwise correct method, condone*
>
> *eg, for 1 mark accept*
>
> *(£6.70 – 250) ÷ 12*
>
> *!   Condone correct embedded solutions*
>
> *Award 1 mark, for a response which shows 35 as the embedded solution to their working*

1

[2]

4. (a) $n + 3$ **or** $3 + n$

> *!   Algebra*
>
> *!   Alternative letter used, eg, for part (a), accept* m *used instead of* n*, if the expression is otherwise correct:*
>
> - $m + 3$

1

(b) $2m - 5$

> *!   Condone unsimplified or unconventional algebra,*
> *eg, for part (b):*
>
> - *$m + m - 5$*
> - *$m2 - 5$*

1

[2]

5.   Makes all four correct decisions, ie:

-     odd   even

> *Accept unambiguous indications, eg:*
>
> - *' y' or ' x' for ticked in each row*

2

or

Makes three correct decisions

1

[2]

6.   Gives correct information for $x = 4$, eg

-     4, too big

-     4, too high

-     4, too much above 1

> ***Do not accept*** *incomplete information that does not link to the*
> *value of 1, eg*
> - *4, too incorrect*

1

Gives correct information for $x = 3.5$, eg

- 1.75, too big

> *! In both the first and second answers, shows correct values but omits or gives incorrect further information, eg*
> - *4, too small*
> *1.75, too _____*
> *Do not award the first mark, but award the second mark*
>
> *! Value rounded*
> *Accept 1.8*
> *Do not accept 1.7*

      1

Gives a logical value for the next trial, and justifies their decision, eg

- 3.2, because I know it is between 3 and 3.5

- 3.25, it is half way between 3 and 3 and a half

- 3.3 because it is bigger than 3 which was too small but smaller than 3.5 which was too big

- 3.4, it has to be smaller than 3.5 (that it is greater than 3 is implicit)

> *! Logical values*
> *Accept any of the following:*
> > *3.1*
> > *3.2*
> > *3.3*
> > *3.4*
> > *3.25*
>
> *Also accept any value between 3.3 and 3.4 provided their justification shows why the solution is between these values*
> *eg, accept (since a further trial has clearly taken place)*
> - *3.35, 3.3 is too small*
> - *3.302, because 3.303 is just over 1*
> *eg, do not accept*
> - *3.35, because I know it is between 3 and 3.5*
>
> *Accept minimally acceptable justification, eg*
> - *3.2, 3.5 is too big*
>
> ***Do not accept*** *incomplete justification, eg*
> - *3.3, it gets closer to 1*
> - *3.25 because it is at an appropriate interval*
>
> *! For the third part, follow-through*
> *If their calculation in the second part for $x = 3.5$ was too small, accept $x = 3.6$, 3.7, 3.75, 3.8 or 3.9 alongside an explanation comparable with those given in the mark scheme*

      1

      [3]

7. Award **TWO** marks for the correct answer of p = 575 **AND** q = 425

 If the answer is incorrect, award **ONE** mark for evidence of an appropriate method, eg

- q + q +150 = 1000

- q + q = 850

- q = 850 ÷ 2

- p = q + 150

> *Both* p and q must be correct for the award of the marks.
>
> *Accept for* **ONE** *mark, answers given in the wrong order, ie p = 425* **AND** *q = 575*

Up to 2

[2]

8. (a)　Award **TWO** marks for the correct answer of 43, even if there are errors in the working.

If the answer is incorrect, award **ONE** mark for evidence of an appropriate calculation of multiplication by 4 and addition of 3, eg:

- 3 + (4 × 10)

- 4 × 10 + 3

- 10 + 10 + 10 + 10 + 3

OR **by drawing** OR **other methods**.

Up to 2

(b)　14

1

(c)　Award **TWO** marks for expressions such as:

- S = 4N + 3

- S = 3 + 4N

- S = N + N + N + N + 3

If the answer is incorrect, award **ONE** mark for evidence of multiplying N by 4 in the expression, eg:

- 4N

- 4 × N

- N.4

- N + N + N + N

OR award **ONE** mark for evidence of adding 3 in the expression, eg:

- N + 3

    Do not accept *S = × 4 + 3 = N*

Up to 2

[5]

9.

$\frac{1}{2}$ or equivalent

! Algebra

Accept equivalent fractions or decimals

2

or

Shows or implies a correct first step of algebraic manipulation that either reduces the number of terms **or** collects variables on one side of the equation and numbers on the other **or** correctly removes the brackets, eg:

- $8y + 96 = 100$

- $y + 12 = 100 \div 8$

- $8y = 4$

OR

Shows or implies a complete correct method, eg:

- $100 \div 8 = 12$ *(error)*
  $12 - 12 = 0$

- $25 \times 4 = 100$
  $12.5 \times 8 = 100$
  $12.5 - 12$

1

> ***Do not accept*** *a first step of algebraic manipulation which has a conceptual error, eg:*
>
> - $y + 12 = 100$
> - $y + 96 = 100$
> - $8y + 12 = 100$
>
> *! Correct embedded solutions*
>
> *Award 1m for a response which shows $\frac{1}{2}$, or*
>
> *equivalent, as the embedded solution to their working*

[2]

10. Award **TWO** marks for the correct answer of 2.25

If the answer is incorrect, award **ONE** mark
for evidence of an appropriate method, eg

algebraic manipulation to reach

$18 = 8t$

> *Answer need not be obtained for the award of the mark.*

Up to 2

[2]

11. Award **TWO** marks for the correct answer of 14

If the answer is incorrect, award **ONE** mark for evidence of an appropriate
method, eg

algebraic manipulation to reach
$4u = 56$

> *Calculation need not be completed for the award of the mark.*
>
> *Accept for **ONE** mark trial and improvement showing two convergent attempts or two attempts which straddle the correct value and which are within the range 11–17 **OR** one error in the collection of terms.*

Up to 2

[2]

12. Award **TWO** marks for a correct answer of 2.25 **AND** 2.75

> *Accept the numbers in any order.*
> *Accept the numbers in fraction form.*

If the answer is incorrect award **ONE** mark for evidence of an appropriate method, eg

$5 \div 2 = 2.5$
AND 2.5 + 0.25
AND 2.5 − 0.25
OR trial and improvement showing two attempts, using numbers between 2 and 3, which either converge towards or straddle the correct answer.

up to 2

[2]

13. Award **TWO** marks for the correct answer of 4.5
OR 4½ OR $^9/_2$ OR $^{27}/_6$.

If the answer is incorrect, award **ONE** mark for evidence of an appropriate method, eg:

$x = 27 \div 6$

> *Accept any equivalent to $^9/_2$*
> *Calculation need not be performed for the award of **ONE** mark, but the method shown must be capable of producing the correct answer.*
> *Accept for the award of **ONE** mark evidence of trial and improvement leading to an incorrect answer, even though this is an inappropriate method of solving linear equations, eg:*
> *$6 \times 5 - 27 = 3$*
> *$6 \times 4 - 27 = -3$*
> *$x = incorrect\ answer\ between\ 4\ and\ 5$*

Up to 2

[2]

14. Award **TWO** marks for the correct answer of 1/2 OR 0.5

If answer is incorrect, award **ONE** mark for evidence of appropriate method which results in:

- $8t = 4$, or equivalent.

Up to 2

[2]