Number, Patterns and Sequences-Questions

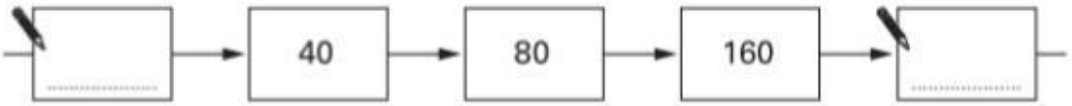
Key Stage 3: 2003 Paper 1 Level 3-5

1.

Chains

7. (a) The number chain below is part of a **doubling** number chain.

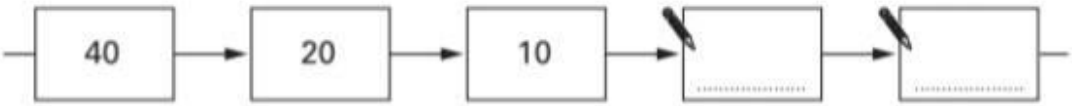
Fill in the two missing numbers.



1 mark

(b) The number chain below is part of a **halving** number chain.

Fill in the two missing numbers.



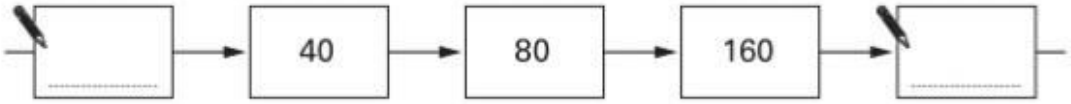
1 mark

Key Stage 3: 2003 Paper 1 Level 4-6

2.

1. (a) The number chain below is part of a **doubling** number chain.

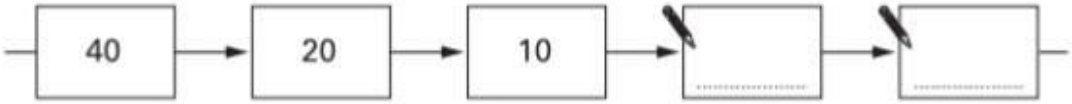
Fill in the two missing numbers.



1 mark

(b) The number chain below is part of a **halving** number chain.

Fill in the two missing numbers.



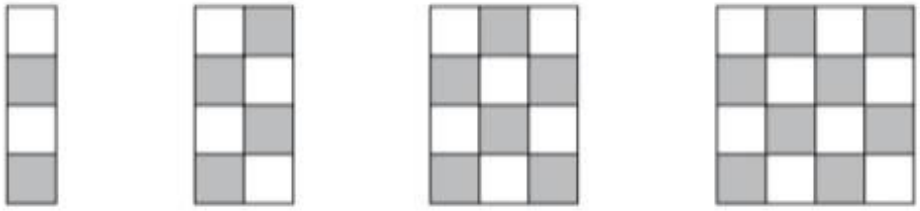
1 mark

Key Stage 3: 2005 Paper 2 Level 3-5

3.

10. Here is a sequence of shapes made with grey and white tiles.

shape number 1 | shape number 2 | shape number 3 | shape number 4



The number of grey tiles = 2 × the shape number
The number of white tiles = 2 × the shape number

(a) Altogether, how many tiles will be in shape number **5**?

..... tiles

1 mark

(b) Altogether, how many tiles will be in shape number **15**?

..... tiles

1 mark

(c) Write the missing number below.

The **total** number of tiles = ... × the shape number

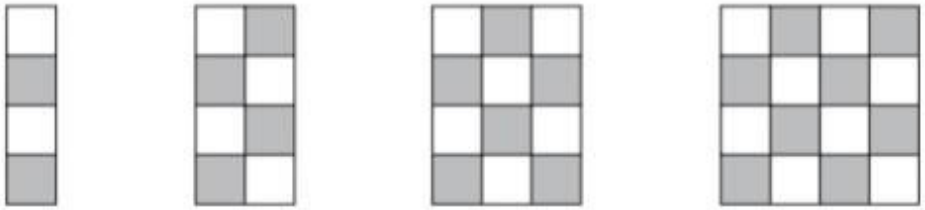
1 mark

Key Stage 3: 2005 Paper 2 Level 4-6

4.

3. Here is a sequence of shapes made with grey and white tiles.

shape number 1 | shape number 2 | shape number 3 | shape number 4



The number of grey tiles = 2 × the shape number

The number of white tiles = 2 × the shape number

(a) Altogether, how many tiles will be in shape number **5**?

..... tiles

1 mark

(b) Altogether, how many tiles will be in shape number **15**?

..... tiles

1 mark

(c) Write the missing number below.

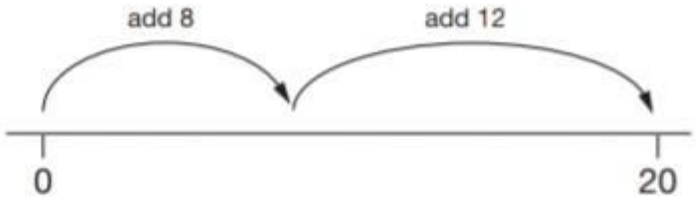
The **total** number of tiles = ... × the shape number

1 mark

Key Stage 3: 2006 Paper 1 Level 3-5

5.

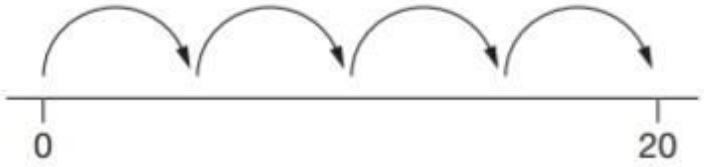
2. This number line shows one way to use **two steps** to move from 0 to 20



(a) On the number line below, show a **different** way to use **two steps** to move from 0 to 20

1 mark

(b) This number line shows how to use **four steps** of the **same size** to move from 0 to 20

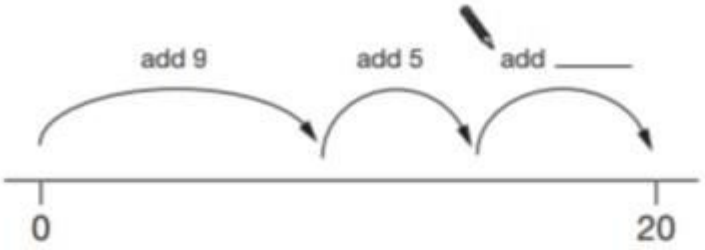


Complete the sentence below.

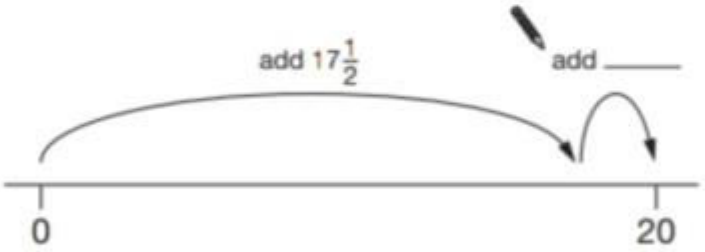
Each step is **add** _____

1 mark

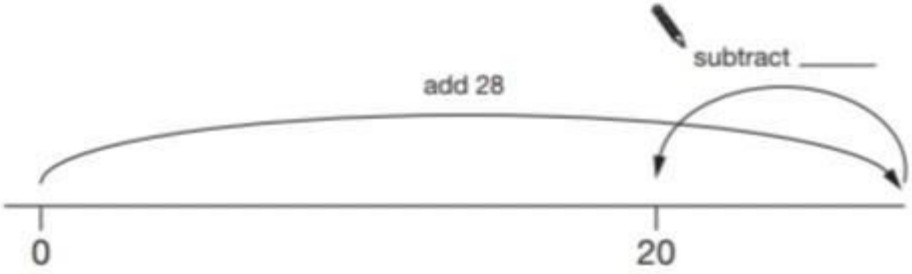
(c) Write the missing number on each number line to show how to move from 0 to 20



1 mark



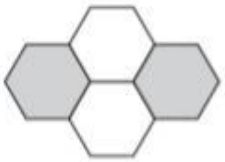
1 mark



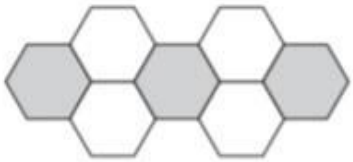
1 mark

6.

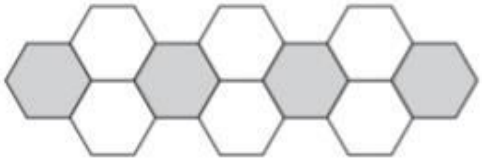
19. Look at this sequence of patterns made with hexagons.



pattern number **1**



pattern number **2**



pattern number **3**

To find the number of hexagons in pattern number n you can use these rules:

Number of **grey** hexagons	=	$n + 1$
Number of **white** hexagons	=	$2n$

Altogether, what is the total number of hexagons in **pattern number 20**?

2 marks

Key Stage 3: 2006 Paper 2 Level 3-5

7.

9. (a) These rules show how to get from one number to the next in these sequences.

Use the rules to write the next **two** numbers in each sequence.

Rule: **Add 8**				
	4	12	_____	_____

1 mark

Rule: **Multiply by 3**				
	4	12	_____	_____

1 mark

Rule: **Divide by 4 then add 11**				
	4	12	_____	_____

1 mark

(b) A sequence of numbers starts like this:

30 22 18

Could the rule be **Subtract 8**?

☐ Yes ☐ No

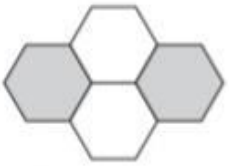
Explain your answer.

1 mark

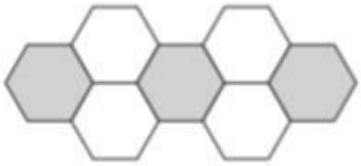
Key Stage 3: 2006 Paper 1 Level 4-6

8.

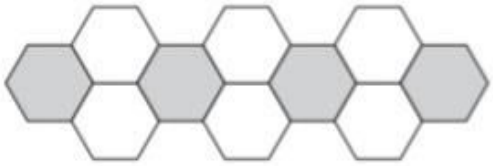
13. Look at this sequence of patterns made with hexagons.



pattern number **1**



pattern number **2**



pattern number **3**

To find the number of hexagons in pattern number ***n*** you can use these rules:

Number of **grey** hexagons	=	$n + 1$
Number of **white** hexagons	=	$2n$

Altogether, what is the total number of hexagons in **pattern number 20**?

_____

_____

2 marks

Key Stage 3: 2006 Paper 2 Level 4-6

9.

2. (a) These rules show how to get from one number to the next in these sequences.

Use the rules to write the next **two** numbers in each sequence.

Rule: **Add 8**			
4	12	_____	_____

1 mark

Rule: **Multiply by 3**			
4	12	_____	_____

1 mark

Rule: **Divide by 4 then add 11**			
4	12	_____	_____

1 mark

(b) A sequence of numbers starts like this:

30 22 18

Could the rule be **Subtract 8**?

☐ Yes ☐ No

Explain your answer.

1 mark

10.

19. Look at these pairs of number sequences.

The second sequence is formed from the first sequence by adding a number or multiplying by a number.

Work out the missing nth terms.

(a) 5, 9, 13, 17, ... nth term is $4n + 1$

6, 10, 14, 18, ... nth term is _____ _____ 1 mark

(b) 12, 18, 24, 30, ... nth term is $6n + 6$

6, 9, 12, 15, ... nth term is _____ _____ 1 mark

(c) 2, 7, 12, 17, ... nth term is $5n - 3$

4, 14, 24, 34, ... nth term is _____ _____ 1 mark

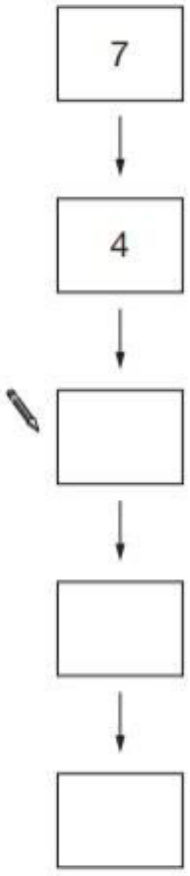
Key Stage 3: 2007 Paper 1 Level 3-5

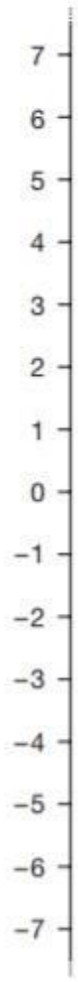
11.

2. A sequence of numbers **decreases by 3** each time.

Write the missing numbers in the sequence below.

You can use the number line on the right to help you.





____

____

2 marks

Key Stage 3: 2007 Paper 2 Level 3-5

12.

1. Each rule below makes a sequence.

Use the rule to write the **next two numbers** for each sequence.

Rule: **Add 3** to the last number					
2	5	8	_____	_____	1 mark

Rule: **Double** the last number then **add 1**					
2	5	11	_____	_____	1 mark

Rule: **Multiply** the last number **by 3** then **subtract 1**					
2	5	14	_____	_____	1 mark

Key Stage 3: 2008 Paper 2 Level 4-6

13.

28. To find the nth triangular number, you can use this rule.

$$n\text{th triangular number} = \frac{n}{2}(n+1)$$

Example: 3rd triangular number $= \frac{3}{2}(3+1)$

$= 6$

(a) Work out the **10th** triangular number.

1 mark

(b) Now work out the **100th** triangular number.

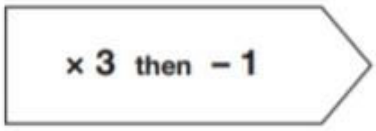
1 mark

Key Stage 3: 2009 Paper 1 Level 3-5

14.

16. (a) A number chain starts

$1 \longrightarrow 2 \longrightarrow 5 \longrightarrow \ldots$

To find the next number you use the rule 

Write the next two numbers in the number chain.

$1 \longrightarrow 2 \longrightarrow 5 \longrightarrow \_\_\_\_ \longrightarrow \_\_\_\_$

1 mark

(b) Here is a different number chain.

$3 \longrightarrow 9 \longrightarrow 27 \longrightarrow 81 \longrightarrow \ldots$

What could the **rule** be to find the next number?

1 mark

Key Stage 3: 2009 Paper 2 Level 3-5

15.

15. (a) I count on in **equal steps**.

My fourth number is 42, my fifth number is 47

?			42	47

What is my first number?

_____ 1 mark

(b) I count on in **equal steps**.

My first number is –3, my fifth number is 5

–3		?		5

What is my third number?

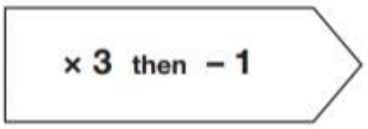
_____ 2 marks

Key Stage 3: 2009 Paper 1 Level 4-6

16.

9. (a) A number chain starts

$1 \longrightarrow 2 \longrightarrow 5 \longrightarrow \ldots$

To find the next number you use the rule 

Write the next two numbers in the number chain.

$1 \longrightarrow 2 \longrightarrow 5 \longrightarrow \_\_\_\_ \longrightarrow \_\_\_\_$

1 mark

(b) Here is a different number chain.

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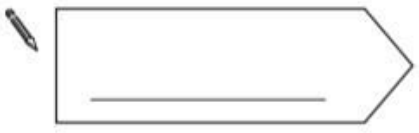


1 mark

Key Stage 3: 2009 Paper 2 Level 4-6

17.

6. (a) I count on in **equal steps**.

My fourth number is 42, my fifth number is 47

?			42	47

What is my first number?

_____

1 mark

(b) I count on in **equal steps**.

My first number is –3, my fifth number is 5

–3		?		5

What is my third number?

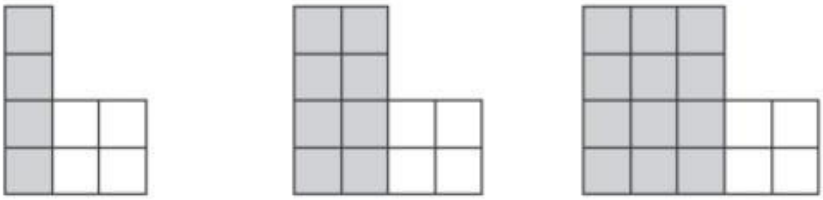
_____

2 marks

Key Stage 3: 2010 Paper 2 Level 3-5

18.

21. I make a sequence of shapes using grey and white tiles.



shape number 1 | shape number 2 | shape number 3

The total number of tiles in shape number n is $\mathbf{4}n + \mathbf{4}$

(a) I remove **half the tiles** to make the sequence of shapes below.

shape number 1 | shape number 2 | shape number 3

Complete the sentence.

The total number of tiles in shape number n is _____

1 mark

(b) Then I remove **half the tiles** again.

shape number 1 | shape number 2 | shape number 3

Complete the sentence.

The total number of tiles in shape number n is _____

1 mark

Key Stage 3: 2010 Paper 1 Level 4-6

19.

21. Look at the sequence below.

To get the next term in the sequence, **subtract 90** from the term before.

500 410 320 ...

Write the first two terms of the sequence that are **less than zero**.

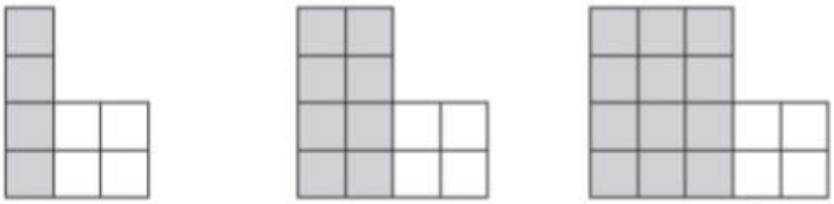
_____ , _____

2 marks

Key Stage 3: 2010 Paper 2 Level 4-6

20.

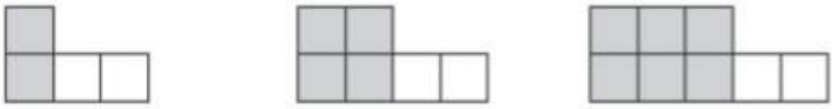
11. I make a sequence of shapes using grey and white tiles.



shape number 1 | shape number 2 | shape number 3

The total number of tiles in shape number n is $\mathbf{4n + 4}$

(a) I remove **half the tiles** to make the sequence of shapes below.



shape number 1 | shape number 2 | shape number 3

Complete the sentence.

The total number of tiles in shape number n is _____

1 mark

(b) Then I remove **half the tiles** again.

shape number 1 | shape number 2 | shape number 3

Complete the sentence.

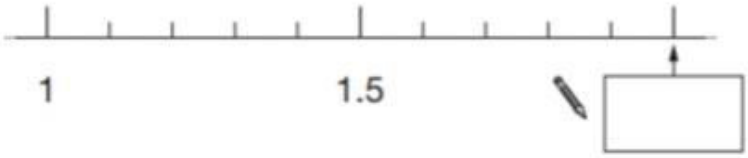
The total number of tiles in shape number n is _____

1 mark

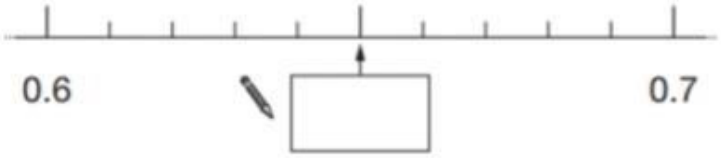
Key Stage 3: 2011 Paper 1 Level 4-6

21.

8. Write the missing number on each of these number lines.



1 mark



1 mark