testbase

Week 16

Algebra

Name: _____

Class: _____

Date: _____

Time: **41 minutes**

Marks: **41 marks**

Comments:

1 Here is a rule for the time it takes to cook a chicken.

> **Cooking time = 20 minutes plus an extra 40 minutes for each kilogram**

How many minutes will it take to cook a 3 kg chicken?

minutes

1 mark

What is the mass of a chicken that takes 100 minutes to cook?

kg

1 mark

2  and  each stand for a different number.

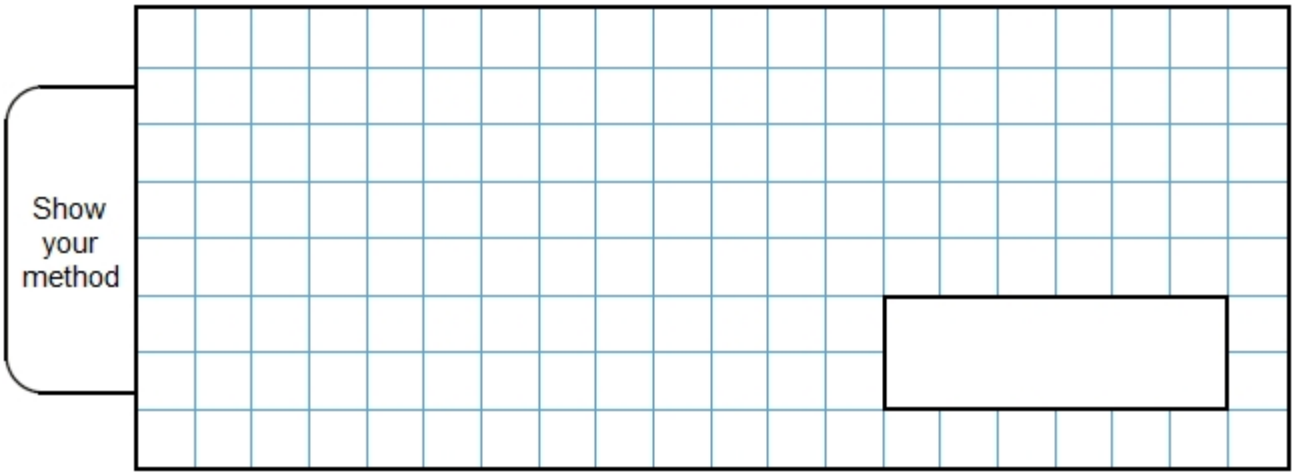
 = 34

What is the value of  ?

1 mark

3 Find the value of t in this equation.

$$33 - 8t = 15$$



2 marks

4 k stands for a whole number.

$k + 7$ is greater than 100

$k - 7$ is less than 90

Find **all** the numbers that k could be.

_____

2 marks

5 **k**, **m** and **n** each stand for a whole number.

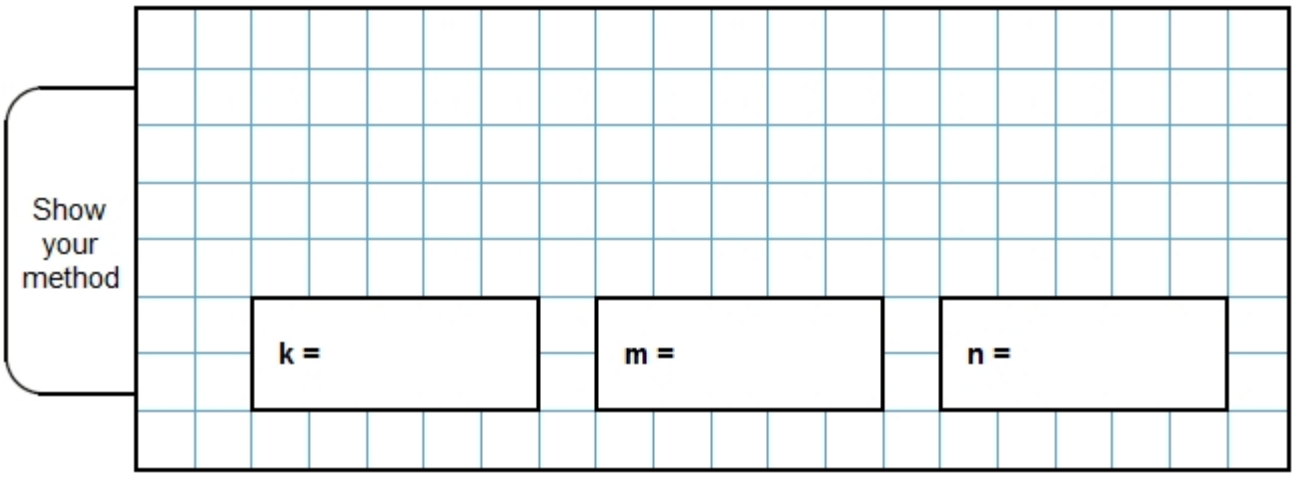
They add together to make 1500

$$k + m + n = 1500$$

m is **three times** as big as **n**.

k is **twice** as big as **n**.

Calculate the numbers **k**, **m** and **n**.



2 marks

6 ***n*** stands for a whole number.

2*n* is greater than 30

5*n* is less than 100

Write **all** the numbers that ***n*** stands for.

2 marks

7

Write the missing numbers so that $2a + 5b = 30$

One is done for you.

$2a + 5b = 30$ when $a = 0$ and $b =$ 6

$2a + 5b = 30$ when $a = 5$ and $b =$ _____

1 mark

$2a + 5b = 30$ when $a = 15$ and $b =$ _____

1 mark

8

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

9 Look at this expression.

$$10y + 2$$

When $y = 0.4$, the value of $10y + 2$ is an **even** number because $10 \times 0.4 + 2 = 6$

Write a value for y so that $10y + 2$ is a **prime** number.

$y =$ _____

1 mark

Now write a value for y so that $10y + 2$ is a **square** number.

$y =$ _____

1 mark

10 $\boldsymbol{j}$ and $\boldsymbol{k}$ stand for two numbers.

Double $\boldsymbol{j}$ equals half of $\boldsymbol{k}$.

Write numbers to complete the sentence below.

When **j** is _____ then **k** is _____

1 mark

11 Here is an equation.

$m - 2n = 10$

When $n = 20$ what is the value of m?

$m =$ _____

1 mark

When $m = 20$ what is the value of n?

$n =$ _____

1 mark

12 Solve this equation to find the value of y.

$8(y + 12) = 100$

Show your method

$y =$

2 marks

13

(a) There are n counters in Alfie's bag.

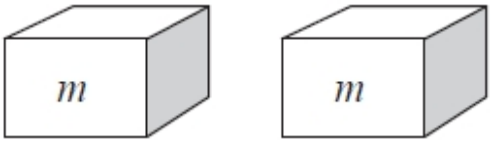
Alfie puts **3** more counters in the bag.

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.

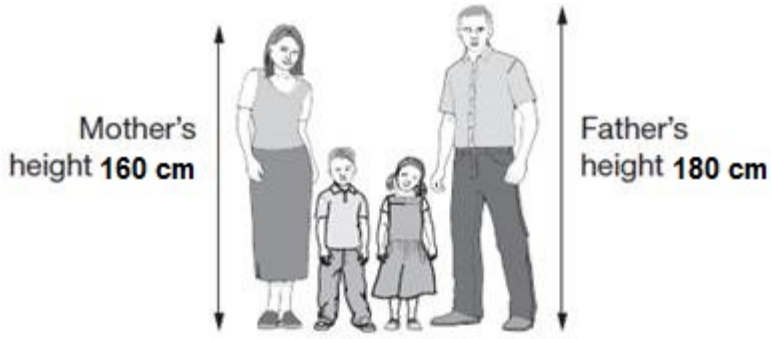


She puts all her counters together in a pile, then removes **5** of them.

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

1 mark

14 Here are Alfie and Emma with their parents.



You can use the table below to predict how tall children will be when they are adults.

There is one formula for boys and a different one for girls:

Boy's predicted height	Girl's predicted height
$0.4(x + y) + 42$	$0.4(x + y) + 29$
x is the father's height in cm. y is the mother's height in cm.	

(a) Calculate the predicted height of Alfie when he is an adult.

cm

1 mark

(b) When Emma is an adult, she is predicted to be taller than her mother.

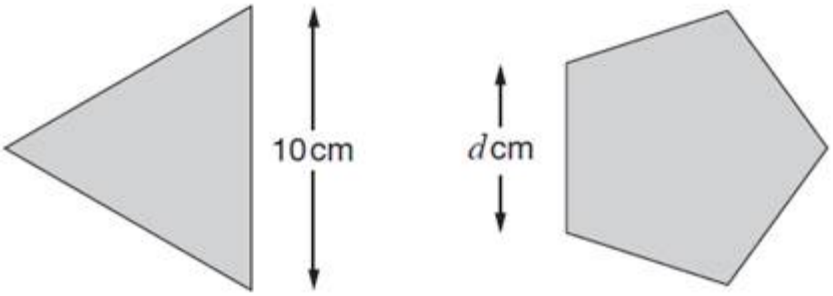
How much taller?

cm

1 mark

15 Here are an equilateral triangle and a regular pentagon.

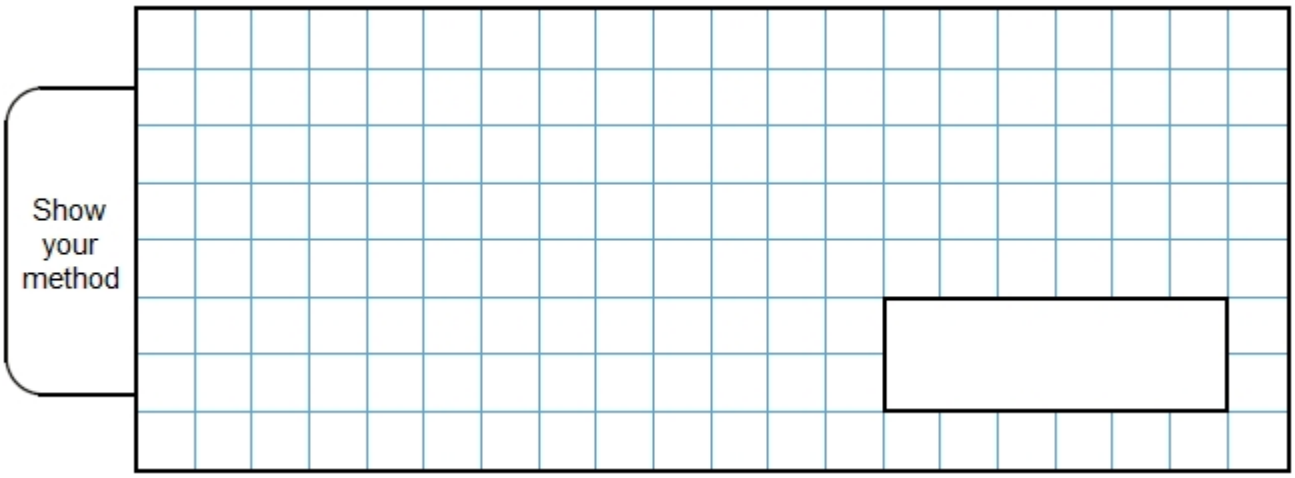
Not actual size



Each side of the triangle is 10 cm
Each side of the pentagon is d cm

The perimeter of the pentagon is 4 centimetres more than the perimeter of the triangle.

What number does d represent?



2 marks

16 Maria bakes cakes and sells them in bags.

She uses this formula to work out how much to charge for one bag of cakes.

Cost = number of cakes × 20p + 15p for the bag

How much will a bag of 12 cakes cost?

£

1 mark

Olivia buys a bag of cakes for £5.15

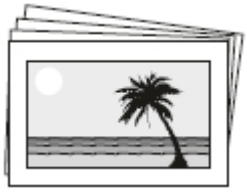
Use the formula to calculate how many cakes are in the bag.

Show your method

2 marks

17 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.

$$\mathbf{C} = 250 + 12\boldsymbol{n}$$

$\boldsymbol{n}$ 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

18

$n = 22$

What is $2n + 9$?

1 mark

$2q + 4 = 100$

Work out the value of q.

$q =$

1 mark

19

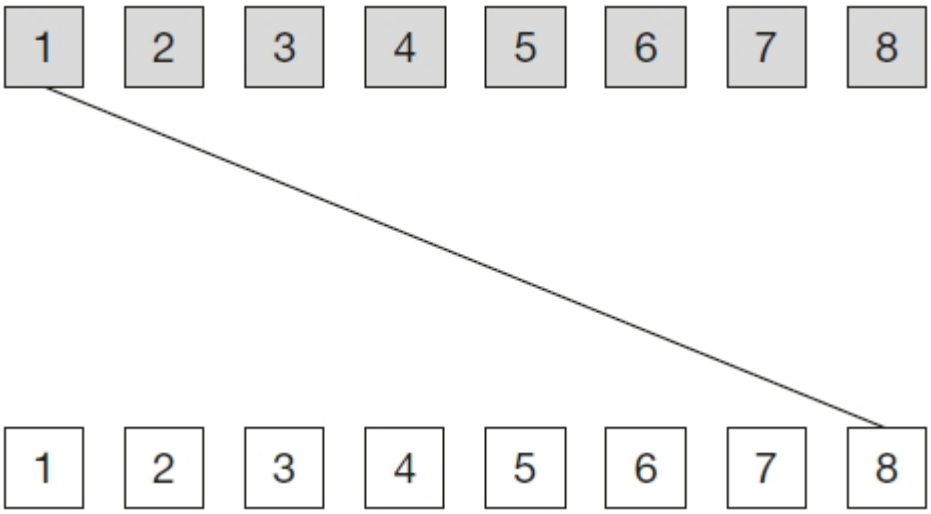
g stands for a number on a grey card.

w stands for a number on a white card.

Join all pairs of numbers that match this rule:

$2g + w = 10$

One is done for you.



2 marks

20 Here is an equation.

$$k = 100 - 4n$$

(a) Find the value of k when $n = 60$

1 mark

(b) Find the value of n when $k = 99$

$n =$ ☐

1 mark

21 Solve this equation.

$$7y + 12 = 5y + 40$$

Show your method

$y =$ ☐

2 marks

Mark schemes

1

(a) 140

The answer is a time interval

1

(b) 2

1

[2]

2

17

U1

[1]

3

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]

4

Award **TWO** marks for all three numbers, as shown:

94, 95, 96

Accept numbers written in any order.

*All three numbers and no incorrect numbers must be given for the award of **TWO** marks.*

If the answer is incorrect, award **ONE** mark for:

- two numbers correct and none incorrect

OR

- three numbers correct and one incorrect

OR

- 93, 94, 95, 96, 97

Up to 2 (U1)

[2]

5 Award **TWO** marks for all three answers correct, as shown:

$k =$ **500** $m =$ **750** $n =$ **250**

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

- $2n + 3n + n + 1500$
  $1500 \div 6$

OR

a trial and improvement method, eg

- 1000 + 1500 + 500 = 3000
  200 + 300 + 100 = 600
  400 + 600 + 200 = 1200

*Accept for **ONE** mark any permutation of the correct answers, eg*

$k = 750, m = 250, n = 500$

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

A 'trial and improvement' method must show evidence of improvement.

Up to 2 (U1)

[2]

6 Award **TWO** marks for four numbers correct as shown:

16 **AND** 17 **AND** 18 **AND** 19

If the answer is incorrect, award **ONE** mark for:

- three numbers correct and none incorrect

OR

- all four numbers correct and one incorrect

Numbers may be given in any order.

Up to 2m
U1

[2]

7 (a) 4

! Algebra

1

(b) 0

1

[2]

8 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]

9 (a) Gives a value for y such that $10y + 2$ is a prime number, eg:

- 0
- $\frac{1}{2}$
- 1.7

1

(b) Gives a value for y such that $10y + 2$ is a square number, eg:

- -0.1
- 0.2
- 0.7
- 1.4

1

[2]

10 Two numbers where the value of k is four times the value of j, eg

When $\boldsymbol{j}$ is **5** When $\boldsymbol{k}$ is **20**

OR

When $\boldsymbol{j}$ is **11** When $\boldsymbol{k}$ is **44**

[1]

11 (a) 50

1

(b) 5

1

[2]

12 $\frac{1}{2}$ 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]

13 (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]

14 (a) 178

1

(b) 5

1

[2]

15 6.8

Accept equivalent fractions and decimals, eg:

- $6\frac{4}{5}$
- $\frac{34}{5}$

2

or

Shows or implies a complete, correct method, eg:

- $5d = 3 \times 10 + 4$
  $5d = 34$
  $d = 34 \div 5$
- $3 \times 10 = 40$ *(error)*
  $40 + 4 = 44$
  $44 \div 5 = 8.4$ *(error)*
- $30 + 4 = 34$
  $34 \div 5$

***Do not accept** incorrect methods, eg:*
where the perimeter of the pentagon is treated as being 4cm less *than the perimeter of the triangle:*

- *$30 - 4 = 26$*
  $26 \div 5 = 5.2$

1

[2]

16 (a) £2.55

1

(b) Award **TWO** marks for the correct answer of 25

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

- £5.15 − 15p = £5
  £5 ÷ 20p

OR

- £5.15 − 15p = £5
  5 × 5

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

Commentary: The 2014 national curriculum specifies that pupils should use simple formulae (6A2).

Up to 2

[3]

17 35

2

or

Shows or implies a complete correct method, eg:

- (670 – 250) ÷ 12
- 670 = 250 + 12*n*
  12*n* = 670 - 250
  12*n* = 430 (error)
  n = 430 ÷ 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]

18 (a) 53

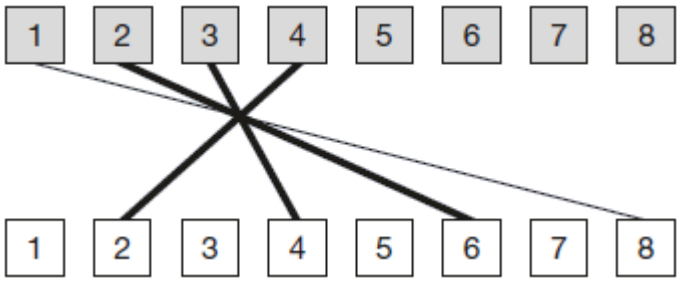
1

(b) 48

1

[2]

19 Draws the three correct lines and no incorrect lines, ie:



! Lines do not touch the shapes
Accept provided the intention is clear

2

or

Draws two correct lines and no incorrect lines

OR

Draws the three correct lines and one incorrect line

1

[2]

20 (a) −140

1

(b) 0.25 **or** $\frac{1}{4}$

Accept equivalent fractions or decimals
***Do not accept** embedded solutions*

1

[2]

21 14

! Algebra
See guidance

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, eg:

- $2y + 12 = 40$
- $7y = 5y + 28$
- $7y - 5y = 40 - 12$
- $2y = 28$
- $28 \div 2$

! Condone correct embedded solutions

Award 1 mark, for a response which shows 14 as the embedded solution to their working, eg:

- *7y + 12 = 5y + 40*
  (7 × 14) + 12 = (5 × 14) + 40
  110 = 110

1

[2]