

United Kingdom  
Mathematics Trust

TEAM MATHS  
CHALLENGE  
2018

REGIONAL FINAL

RELAY

# A1

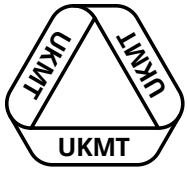
Ann ambles along a track at a speed of 3 kilometres per hour.

Sue speeds off from the same place on her bicycle ten minutes later at 6 kilometres per hour.

How far from the start, in km, does Sue overtake Ann?

ANSWER:

km



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# A2

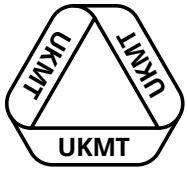
This frequency table shows the number of chocolate bars eaten in a week by each child in a class. The number of children eating five bars per week is  $x$ .

The mean number of bars eaten per week is three.

What is the value of  $x$ ?

Number of bars	0	1	2	3	4	5
Frequency	6	7	4	9	10	$x$

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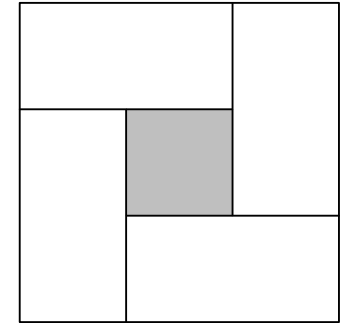
A3

The diagram shows four identical rectangles surrounding a shaded square.

The area of the shaded square is  $81 \text{ cm}^2$ .

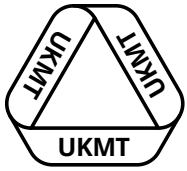
The perimeter of each rectangle is  $58 \text{ cm}$ .

What is the area of one rectangle?



ANSWER:

$\text{cm}^2$



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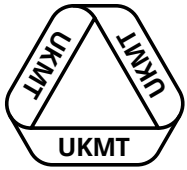
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A4

Two consecutive primes, each less than 100, have a difference of eight.

What is the sum of these two primes?

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A5

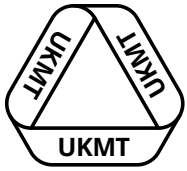
A leading retailer estimates that, on average, 1.4 million bananas are thrown away in Britain every day.

Using this fact, estimate the number of bananas that will be thrown away this year.

Give your answer to the nearest million.

ANSWER:

million



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# A6

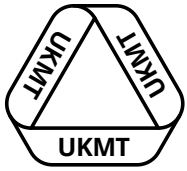
Somebody has messed around with Jake's calculator, swapping the + and  $\div$  buttons, and also swapping the  $-$  and  $\times$  buttons.

Jake punches in this calculation:

$$(12 \div 18 + 6) \times (5 - 2 \times 16)$$

What answer does the calculator give?

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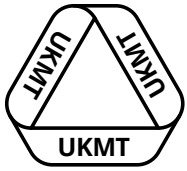
A7

My digital clock always displays four digits and uses the 24-hour convention. For example, three twenty-eight in the afternoon is written as 15:28.

It has the curious feature that every time the sum of the digits is three, the clock peeps once.

How many peeps are heard in each 24-hour period?

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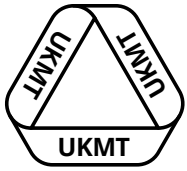
A8

The angles of a right-angled triangle are in the ratio  $1 : 2 : n$ , where  $n$  is a positive integer. There is more than one possible value for  $n$ .

What is the sum of the possible values of  $n$ ?

ANSWER:





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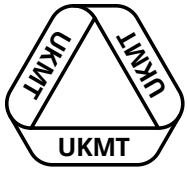
RELAY

A9

Afternoon tea costs £16.95 plus £4.95 to add a glass of freshly squeezed orange juice. Four people decide to have this meal, but only two of them opt for the glass of orange juice.

What is the 10% service charge on the whole bill?

ANSWER: £



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# A10

Instead of pounds and pence, the currency in Calcaria is splots and dags. 1 splot is worth 80 dags.

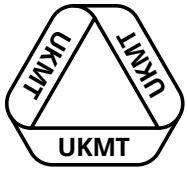
One smartphone costs 3 splots 65 dags.

Maria buys five smartphones and pays with a 20 splot note.

How much change does she receive in dags?

ANSWER:

dags



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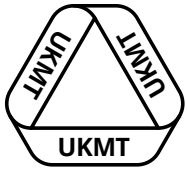
# A11

A large cube is cut into eight identical smaller cubes.

What is the percentage increase in the total surface area?

ANSWER:

%



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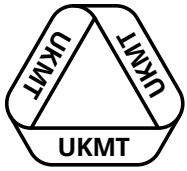
# A12

Find the median of the following numbers.

$$\frac{1}{3}, \quad \frac{7}{20}, \quad \frac{17}{48}, \quad \frac{27}{80}, \quad \frac{29}{80}, \quad \frac{41}{120}$$

Give your answer as a fraction in its simplest terms.

ANSWER:



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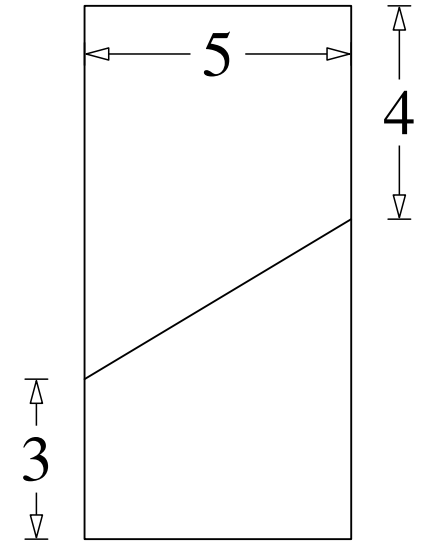
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# A13

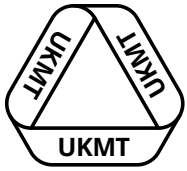
A rectangle is dissected into two trapeziums as shown here.

The difference in the areas of the trapeziums is  $a \text{ cm}^2$ . The difference in the perimeters of the trapeziums is  $b \text{ cm}$ .

What is the value of  $(a - b)$ ?



ANSWER:



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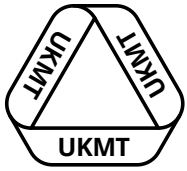
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# A14

The number 9701 is the product of two prime numbers. The difference between the two prime numbers is 20.

Find the sum of the two prime numbers.

ANSWER:



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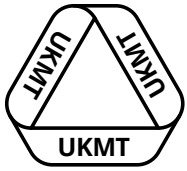
RELAY

# A15

$x\%$  of  $y$  is  $(y - 15)$  and  $y\%$  of  $(x + 30)$  is 50.

What is the value of  $x + y$ ?

ANSWER:



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# B1

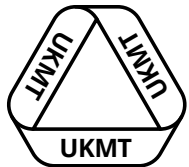
A full glass of milk weighs 545 g. The same glass half-full weighs 320 g.

What is the weight, in grams, of the glass?

ANSWER:

g





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# B2

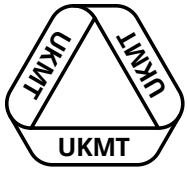
A leading retailer estimates that, on average, 1.5 million sausages are thrown away in Britain every day.

Using this fact, estimate the number of sausages that will be thrown away in February 2019.

Give your answer to the nearest million.

ANSWER:

million



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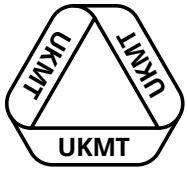
# B3

While attempting many past Intermediate Mathematical Challenge papers, Jenny notices that four biros will last as long as eleven pencils, and that three biros last five weeks.

How long will 18 pencils last? Give your answer to the nearest week.

ANSWER:

weeks



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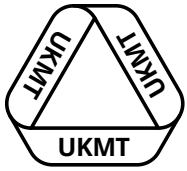
# B4

Two of the vertices of an isosceles triangle are  $(3, 5)$  and  $(1, 1)$ .

The line of symmetry of the triangle is  $y = x + 2$ .

What are the coordinates of the third vertex?

ANSWER:



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# B5

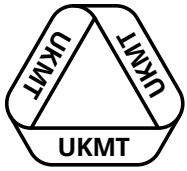
Ann ambles along a track at a speed of 4 kilometres per hour.

Sue speeds off from the same place on her bicycle fifteen minutes later at 8 kilometres per hour.

How long does it take, in minutes, for Sue to catch up with Ann?

ANSWER:

minutes



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# B6

The trapezium  $ABCD$  has parallel sides  $AB$  and  $DC$ .

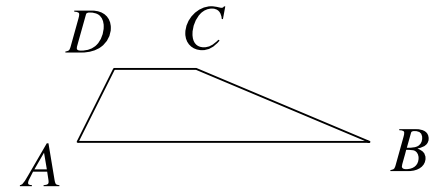
$AB$  is three times the length of  $DC$ .

$AD$  is four-fifths of the length of  $BC$ .

$AD = DC$ .

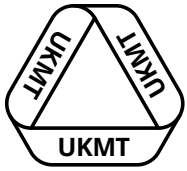
The perimeter of the trapezium is 50 cm.

What is the length of  $BC$ ?



ANSWER:

cm



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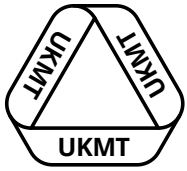
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**B7**

What is 61% of £138 plus 16% of £276 plus 21% of £46?

Give your answer in pounds.

ANSWER: £



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# B8

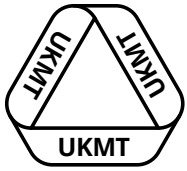
At the recent Maths Fair, a full jug of juice could fill 32 small glasses with 180 ml left over.

When filling the larger glasses, which held 90 ml more than the small glasses, a full jug of juice could fill 24 glasses with 100 ml left over.

How much juice did the jug hold in millilitres?

ANSWER:

ml



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# B9

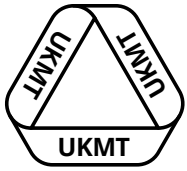
Jack and Jill have savings in the ratio 3 : 5.

Jack generously gives £20 to Jill. The ratio of their revised savings is 1 : 5.

How much money do they have altogether?

ANSWER: £





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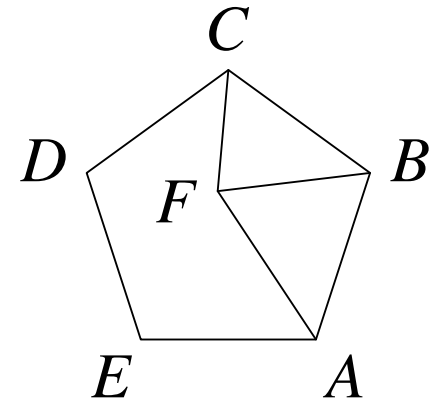
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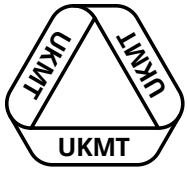
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# B10

The diagram shows an equilateral triangle  $FAB$  inside a regular pentagon  $ABCDE$ .  
What is the size of angle  $FCB$ ?



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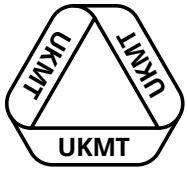
# B11

Cubes of side 1 cm are glued together to make a cuboid measuring 4 cm by 5 cm by 10 cm. All of the faces of the cuboid are painted.

What percentage of the cubes have paint on only one face?

ANSWER:

%



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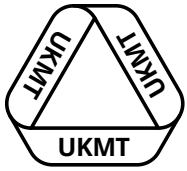
RELAY

# B12

Fully simplify this expression.

$$\frac{1}{2} - \frac{1}{5} + \frac{1}{20} - \frac{1}{50} + \frac{1}{200} - \frac{1}{500}$$

ANSWER:



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# B13

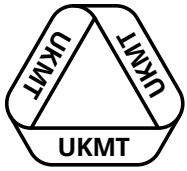
The old Highway Code gave the stopping distance of a car driving at  $V$  mph as:

" $V$  feet for the driver to think and then  $\frac{V^2}{20}$  feet to brake".

What was the stopping distance for a car travelling at 30 mph?

ANSWER:

ft



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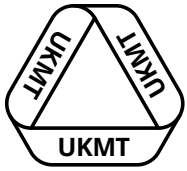
# B14

The digits used to write the last two calendar years in numbers are:

2, 0, 1, 8, 2, 0, 1, 7

What is the mean of the digits used to write the last ten calendar years?

ANSWER:



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# B15

The number 39 270 is a multiple of 17.

Find the sum of the prime factors of 39 270.

ANSWER: