

TEAM MATHS  
CHALLENGE  
2015

NATIONAL FINAL

RELAY

# A1

What is the median of these four numbers?

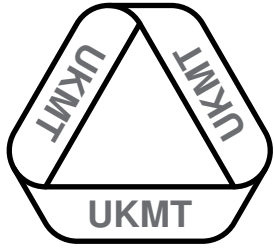
$$20 + 15$$

$$20 - 15$$

$$20 \times 15$$

$$20 \div 15$$

ANSWER:



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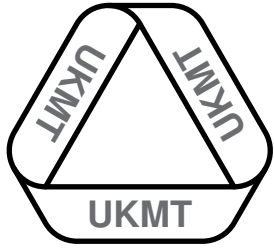
**A2**

Each term of a sequence is formed by doubling the previous term and adding 2.

The first term is 3.

What is the smallest three-digit number in the sequence?

ANSWER:



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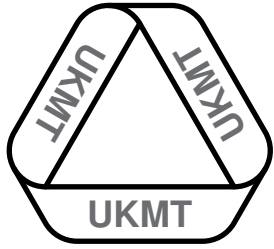
A3

A mathematical grandmother is making jam, but finds she only has 600 g of sugar, instead of the one kilogram that the recipe needs for 1.25 kg of plums.

What weight of plums, in kilograms, must she use for the reduced amount of jam?

ANSWER:

kg



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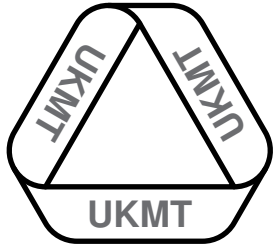
A4

A tennis coach packs tennis balls into square boxes holding 9 balls, and hexagonal ones holding 7 balls.

What is the smallest number of boxes she can use to contain exactly 100 balls, with no spaces?

ANSWER:

boxes



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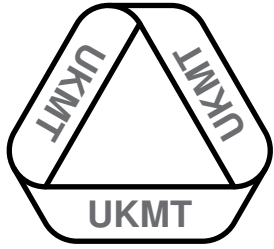
**A5**

A circle has radii  $OA$  and  $OB$  which divide it into two sectors whose areas are in the ratio  $4 : 11$ .

What is the size of angle  $OAB$  in triangle  $AOB$ ?

ANSWER:

degrees



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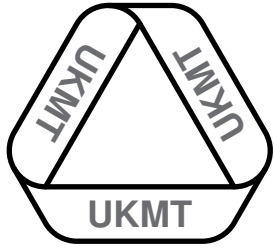
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**A6**

What are the co-ordinates of the point where the lines  $y = x - 2$  and  $y = 2x - 4$  cross?

ANSWER:



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**A7**

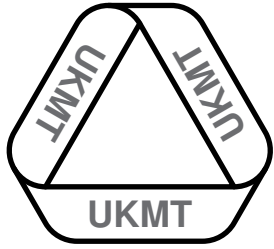
Shona glances at her neighbour's digital watch at the start of the chairman's speech and writes down the time as 12:21.

At the end of the speech she is surprised to see the watch showing 95:21, and realises she has been looking at it upside down.

How long in minutes was the chairman's speech?

ANSWER:

minutes



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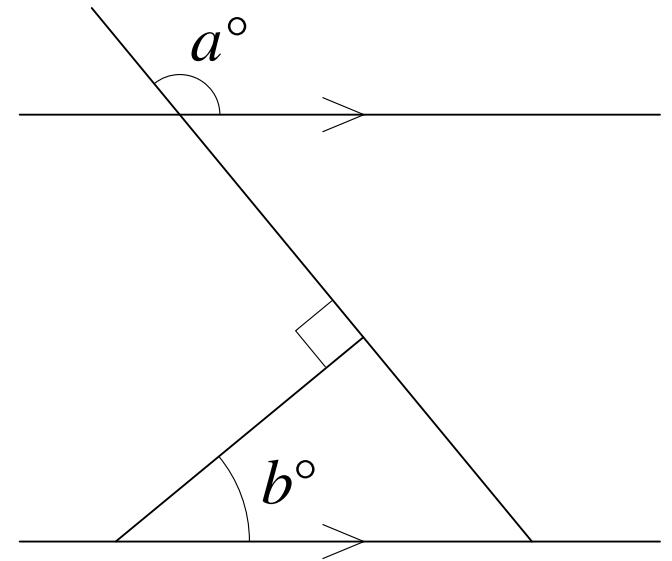
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**A8**

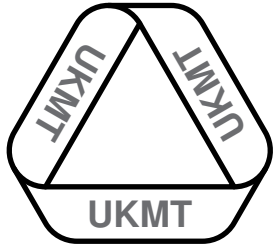
In the diagram,  $a = 132$ .

What is the value of  $b$ ?



ANSWER:





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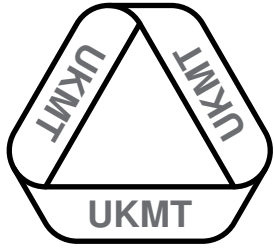
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A9

What is the ratio of the number of primes between 30 and 60 to the number of squares between 30 and 60?

ANSWER:



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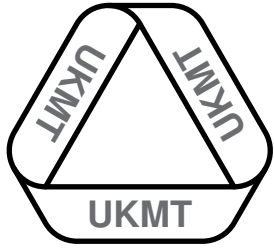
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**A10**

A health centre recorded 380 patients visiting the Accident and Emergency Department at a total cost of £36 091.

To the nearest pound, what is the average cost per patient?

ANSWER: £



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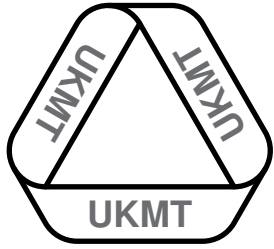
RELAY

**A11**

The total of 13 consecutive integers is 2015.

What is the largest of the integers?

ANSWER:



# A12

Write these improper fractions in ascending order:

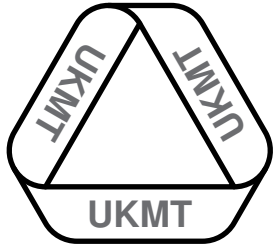
$$\frac{95}{12}, \frac{79}{10}, \frac{87}{11}, \frac{71}{9}$$

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ANSWER:



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# A13

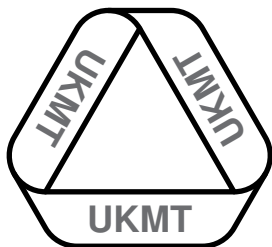
Posters measuring 50 cm by 75 cm must be displayed in portrait orientation. The maximum possible number of posters are put up on a board measuring 1.8 m wide and 0.9 m high.

The posters must not overlap.

What is the area, in  $\text{cm}^2$ , of board left uncovered?

ANSWER:

$\text{cm}^2$



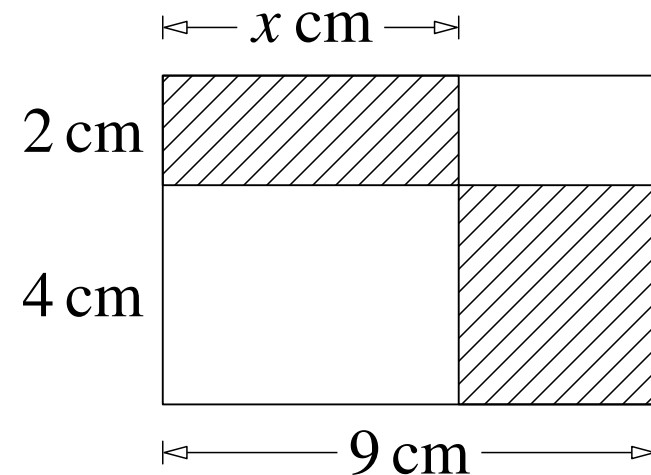
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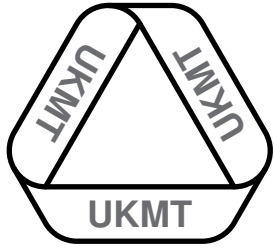
In the diagram, the areas of the shaded rectangles are equal.

What is the value of  $x$ ?



**A14**

ANSWER:



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# A15

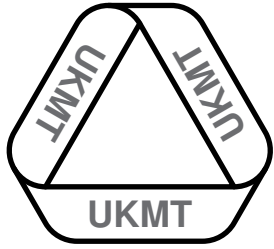
Friends Arthur, Bert, Claire, Dave, Emma, and Fred buy the last 6 tickets for the play “Much Ado About Zero”.

Unfortunately they are not all together: there are three together on row G; two next to each other on row H; and one on their own on row J. The order within these rows is not significant.

Emma and Fred refuse to sit on their own.

How many ways can the groups be organised to sit in the rows they have been allocated?

ANSWER:



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# B1

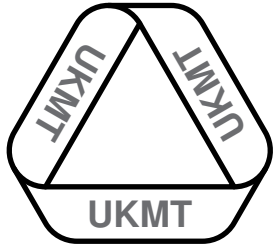
A tennis coach packs tennis balls into rectangular boxes, each holding 6 balls, and hexagonal ones, each holding 7 balls.

What is the smallest number of boxes she can use to contain exactly 100 balls, with no spaces?

ANSWER:

boxes





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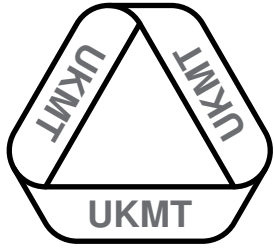
**B2**

A pile of 250 cards is 1 m high.

How thick in millimetres is each card?

ANSWER:

mm



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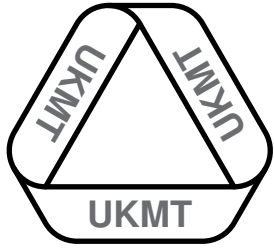
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# B3

What are the co-ordinates of the point where the lines  $y = x + 4$  and  $y = 2x + 1$  cross?

ANSWER:



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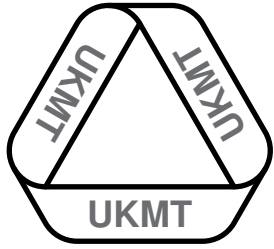
RELAY

# B4

At the Polynumeral Theme Park adult tickets are £8.90 and a child's ticket (aged 5 – 13) is £6.50. Children under 5 years are free. A family ticket (maximum of 2 adults and 3 children 5-13) is only £30.

What will be the lowest price for 3 adults and 4 12-year-old children?

ANSWER: £



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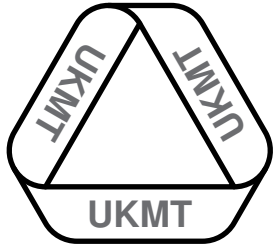
**B5**

Each term of a sequence is formed by doubling the previous term and subtracting 1.

The first term is 4.

What is the smallest three-digit number in the sequence?

ANSWER:



# B6

Write these improper fractions in ascending order:

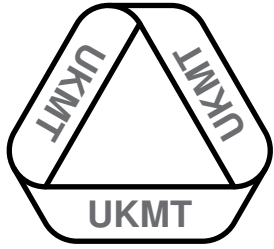
$$\frac{100}{9}, \frac{78}{7}, \frac{89}{8}, \frac{111}{10}$$

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ANSWER:



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**B7**

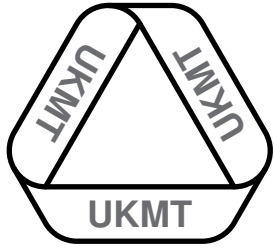
A health centre recorded 281 appointments in one month where patients failed to arrive.

The average length of an appointment is 5 minutes.

To the nearest hour, how much time was wasted?

ANSWER:

hours



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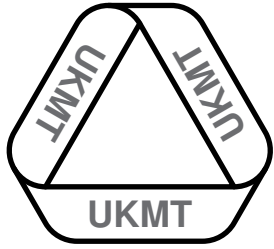
**B8**

A circle has radii  $OA$  and  $OB$  which divide it into two sectors whose areas are in the ratio  $7 : 11$ .

What is the size of angle  $OAB$  in triangle  $AOB$ ?

ANSWER:

degrees



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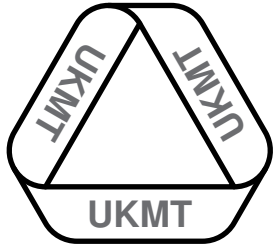
**B9**

The total of 31 consecutive integers is 2015.

What is the largest?

ANSWER:





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# B10

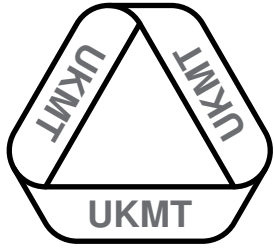
Four grandchildren in a room are 2, 3, 5 and 10 years old.

The mean age of the grandchildren in the room increases by 2 years when a fifth grandchild enters.

How old is the fifth grandchild?

ANSWER:

years



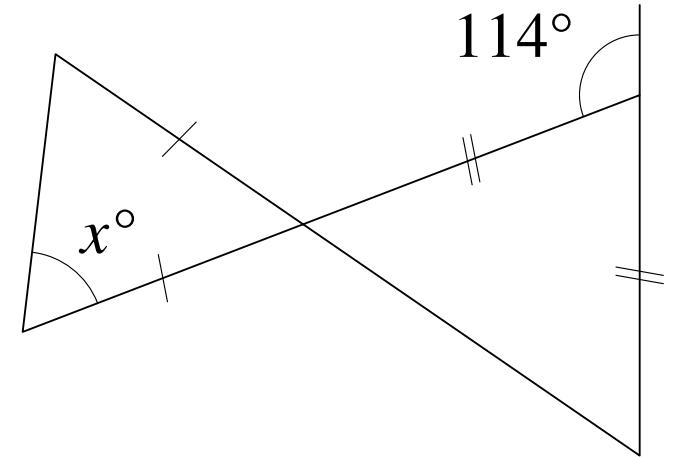
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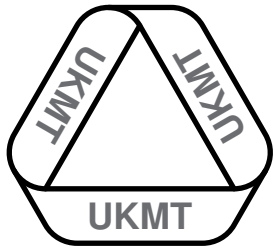
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What is the value of  $x$ ?

**B11**



ANSWER:



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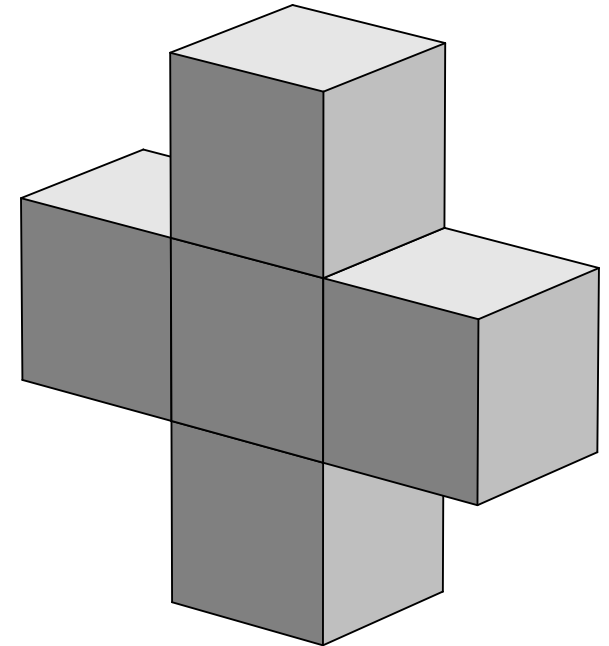
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# B12

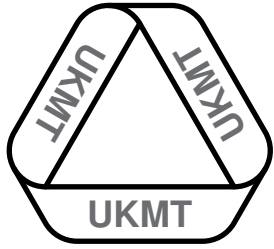
The diagram shows a solid shape.  
Each edge is 2 cm long.

What is the surface area of the  
shape?



ANSWER:

cm<sup>2</sup>



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# B13

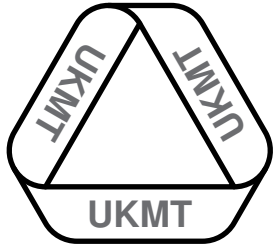
A local market stall selling CDs, books and DVDs recorded their sales on a pie chart. Each customer purchased one item.

The table shows the number of each item sold and the angle of the corresponding sector of the pie chart.

Article	Customers	Degrees
CDs	12	90
Books	16	
DVDs		150

What are the missing numbers?

ANSWER:



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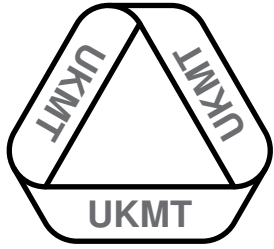
# B14

A toy brick is a prism with a right-angled triangular face that has width 5.4 cm and height 3.5 cm. The volume is  $37.8 \text{ cm}^3$ .

What is the length of the brick?

ANSWER:

cm



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# B15

A worm 3 cm long travels through a wormhole 2 metres long at a steady speed of 84 metres per hour.

How many seconds pass between its “nose” entering the wormhole and the tip of its "tail" emerging?

ANSWER:

seconds