

A1 Calculate

$$2011 \times 2010 - 2010 \times 2009.$$

Pass on the **sum of the digits** in your answer.



A3 *T is the number that you will receive.*

Matilda's class is made up of boys to girls in the ratio 3:2.

If 2 boys get taken to see the Headmistress, the remaining ratio of boys to girls, in its lowest terms, is 5:*T*.

Pass on the number of pupils in the full class.



A2 *T is the number that you will receive.*

Pass on the value of x which satisfies the equation:

$$\frac{2}{x} \times \frac{3}{x} \times \frac{4}{x} = \frac{T}{16}$$



A4 *T is the number that you will receive.*

You are given that:

$$\left(T + \frac{1}{2}\right)^2 = a \frac{b}{c}$$

where $a \frac{b}{c}$ is a mixed number in its lowest terms.

Write down the value of $a + b + c$.



B1

Pass on the value of:

$$(12 \div 0.06) \div (0.8 \div 0.032)$$



Head-to-Head Round – National Final
UKMT Team Maths Challenge 2011

B3 *T* is the number that you will receive.

Given that the value of:

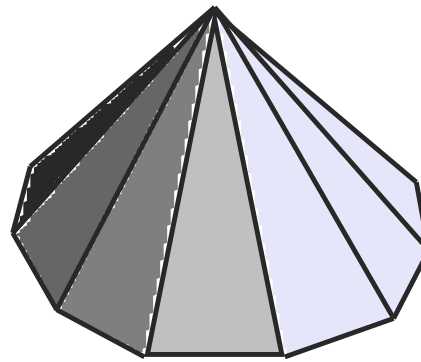
$$\frac{5}{7} - \frac{2}{5} - \frac{1}{T}$$

is $\frac{a}{b}$, a fraction in its lowest terms, pass on the value of $b - a$.



B2 *T is the number that you will receive.*

A pyramid has a regular T -sided polygon as its base.



The sum of all the angles on its surface, including the base, is A° .

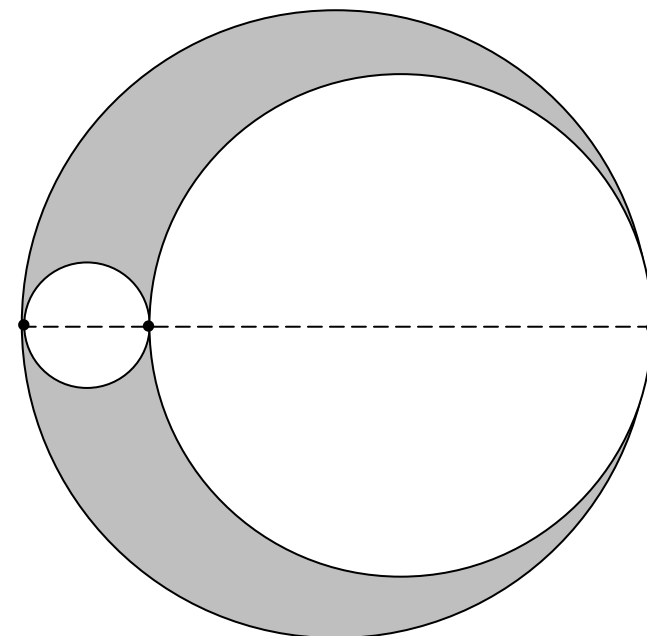
Pass on the value of $\frac{A}{36}$.



B4 *T is the number that you will receive.*

Circles with radii T and $5T$ sit inside a larger circle, with all their centres collinear (on the same line).

They touch at exactly 3 points, as in the diagram.



The total area of the grey region is $n\pi$.

Write down the value of n .



C1 At 3:10 pm Courtney notices that the hour and minute hands on the clock in her classroom are exactly A° apart.

Pass on the value of $(A + 1)$.



C3 *T is the number that you will receive.*

A sequence follows the rule:

“each term is 32 minus half of the previous term”

If the first term is T , pass on the value of the 4th term.

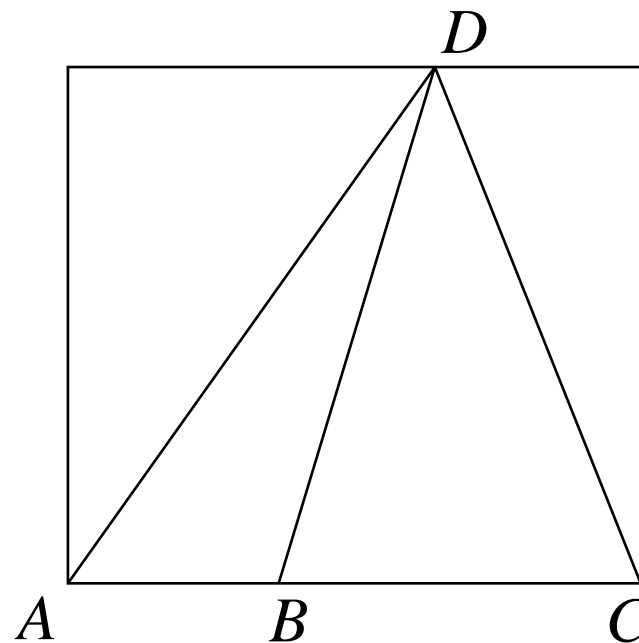


C2 *T* is the number that you will receive.

A square of side *T* cm has triangles *ABD* and *BCD* drawn within it.

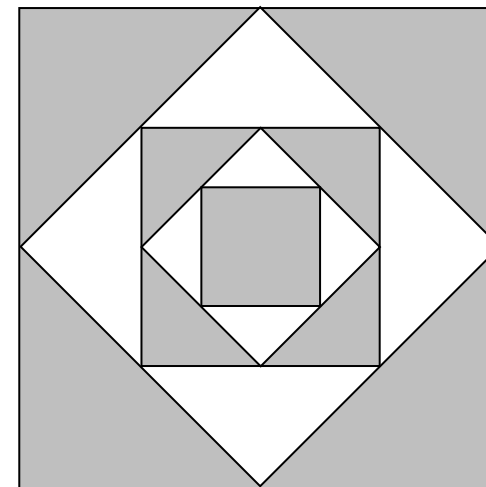
The lengths *AB* and *BC* are in the ratio 2 : 7.

Pass on the area of triangle *ABD* in cm^2 .



C4 *T is the number that you will receive.*

The shape opposite is created by joining the midpoints of the edges of a square to produce a smaller square, and joining the midpoints of this square to produce another smaller square, and repeating this until there are five different squares.



If the outer square has edge length $2T$, what is the total area shaded grey?



D1 In a crazy February, my £10,000 car:

- **increased** in price by 10% during week 1,
- **decreased** in price by 10% during week 2,
- **increased** in price by 10% during week 3, and
- **decreased** in price by 10% during week 4.

After these 4 weeks, the car was £ P cheaper than at the beginning of the month.

Pass on the value of $(P + 1)$.



D3 *T is the number that you will receive.*

Pass on the value of x which satisfies this equation:

$$\frac{2x+5}{2} - \frac{3x-T}{4} = 13$$



D2 *T is the number that you will receive.*

Martin and Steve are running around a 50 metre long circular track. Martin takes 8 seconds to run a lap, and Steve takes 10 seconds to run a lap.

Both keep running at a constant speed, and when Martin has run T metres, Steve is S metres behind.

Pass on the value of S .

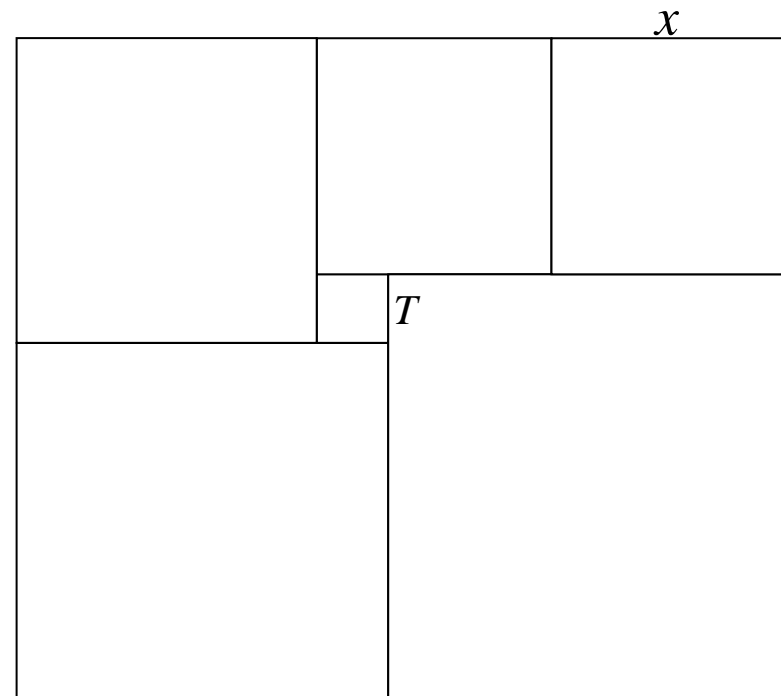


D4 *T* is the number that you will receive.

A rectangle is made up of six squares, as shown in the diagram (*not to scale*).

The smallest square has side length T .

The square in the top right hand corner has side length x .



Write down the value of x .

