



Team
Maths
Challenge
2013

National
Final

Mini Relay
Round

A1

$$1\frac{2}{3} + 4\frac{5}{6} + 7\frac{8}{9} = a\frac{b}{c}$$

where $b < c$ and b and c have no common factors.

Pass on the value of $a + b + c$.



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A3

T is the number that you will receive.

The Lowest Common Multiple of T , $2T$ and 15 is x times the Highest Common Factor of $6T$, 48 and 84.

Pass on the value of x .



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T is the number that you will receive.

A2

A semi-circle with radius $(T + 1)$ cm has the same area as eight circles of radius x cm.

Pass on the value of x .



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T is the number that you will receive.

A4

In *Mathstown* media store, all DVDs cost a fixed price. Each CD costs $\pounds T$ more than each DVD, and each book costs $\pounds(T + 1)$ more than each CD.

On her latest shopping trip to the store, Rachel bought three books, four CDs and five DVDs, spending $\pounds 125$ in total.

In total, 1 book, 1 CD and 1 DVD cost $\pounds P$.

Write down the value of P .



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B1

The product of two whole numbers is equal to the square of a third whole number.

The first two numbers are two less, and three more, respectively, than the third number.

Pass on the sum of the three whole numbers.



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B3

T is the number that you will receive.

This year, Dean is doing a sponsored swim. He aims to swim T lengths of his local pool and is looking to raise £1200 in total.

His sponsors have agreed to give him £10 a length for the first $\frac{T}{2}$ lengths, £20 a length for the next $\frac{T}{5}$ lengths, £30 a length for the next $\frac{T}{10}$ lengths and £ x a length for the rest.

Assuming he swims exactly T lengths and raises exactly £1200, pass on the value of x .



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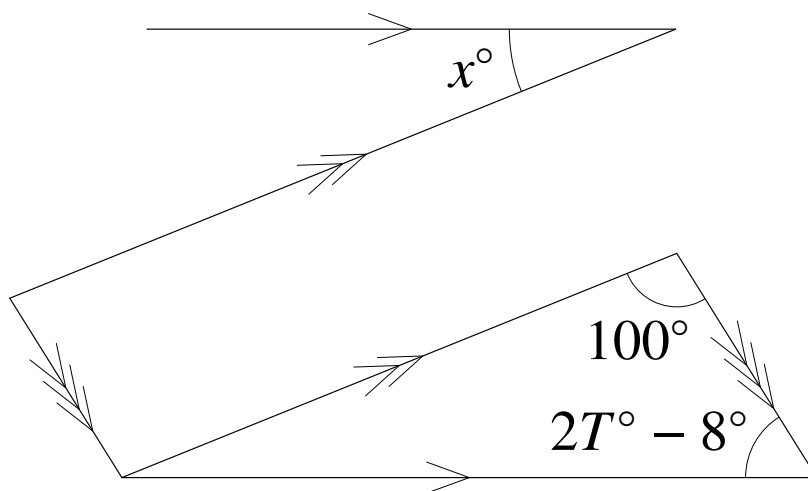
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B2

T is the number that you will receive.

The diagram below shows three interlinked pairs of parallel lines.



Pass on the value of x .



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B4

T is the number that you will receive.

Steve has just returned from holiday.

On his outward flight, he noticed that the ratio of men to women to children was $\frac{T}{10} : 5 : 3$ while on his return flight the ratio was $\frac{T}{12} : 4 : 3$.

He also noticed that there were 60 children on the outward flight and 75 men on the return flight. There were P people on the two flights in total.

Write down the value of P .



C1

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$$K = 12 + (11 \times (10 \times 9 + 8 - 7 \times 6 + 5) - 4) \times 3 \div (2 - 1)$$

Pass on the value of K .

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C3

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T is the number that you will receive.

A year ago, *Cheapo Charlie's Cafe* and *Dodgy Dave's Diner* charged exactly the same as each other for their "Meat Surprise Pie".

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Recently, Charlie cut his prices by 20%, whereas Dave put his prices up by 20%.

Dave now charges T pence for the "Meat Surprise Pie", and Charlie now charges C pence.

Pass on the value of C .

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C2

T is the number that you will receive.

To mix a certain horse medicine, Holly takes a fluid which is 20% water, and mixes it with another fluid which is 15% water, in the ratio 3 : 2.

When Holly makes $(T - 13)$ ml of her medicine, there is H ml of water contained within it.

Pass on the value of H .



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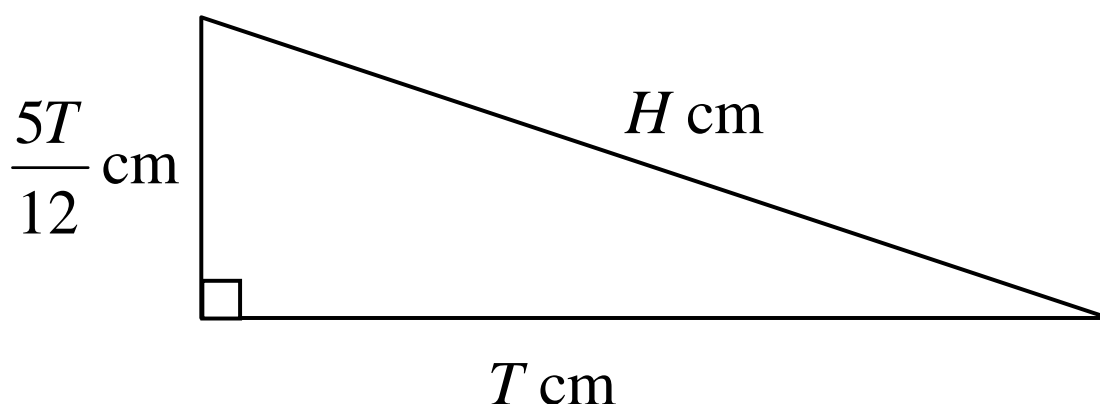
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C4

T is the number that you will receive.

The diagram shows a right-angled triangle with side lengths as marked.



Write down the value of H .



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D1

$$1 - 2(x - 3(x - 4)) = 5$$

Pass on the value of x .



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D3

T is the number that you will receive.

The T th triangular number is added to the $(T + 1)$ th triangular number, and the T th square number is subtracted. The result is N .

Pass on the value of N .

[The T th triangular number is given by $\frac{1}{2}T(T + 1)$.]



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D2

T is the number that you will receive.

Mathstown swimming pool is a cuboid with internal dimensions $25 \text{ m} \times 10 \text{ m} \times 2 \text{ m}$.

It is filled, from empty, by a hose which delivers T litres of water per second. Rounded to the nearest hour, this takes H hours.

Pass on the value of H .

[1 litre = 1000 cm^3 .]



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D4

T is the number that you will receive.

The first T even numbers are added together, and the result is divided by the $(T - 1)$ th triangular number. This gives a top-heavy fraction F in its lowest terms.

Write down the value of F .

[The T th triangular number is given by $\frac{1}{2}T(T + 1)$.]