

United Kingdom
Mathematics Trust

TEAM MATHS
CHALLENGE
2018

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SHUTTLE

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A1

Doris starts a cross-country run at 18:20 and finishes the run at 20:18. During her run, she makes two stops: one for 20 minutes and one for 18 minutes.

Pass on the number of minutes for which Doris is actually running.

A3

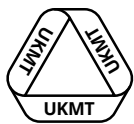
T is the number you will receive.

Kay has T cubes with side 1 cm. She forms them into a $1 \text{ cm} \times 1 \text{ cm} \times T \text{ cm}$ cuboid and calculates its surface area.

Kay then rearranges the cubes to form a different cuboid that has the minimum possible surface area for this number of cubes.

The difference between the surface area of her first cuboid and the surface area of her second cuboid is $K \text{ cm}^2$.

Pass on the value of K .



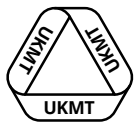
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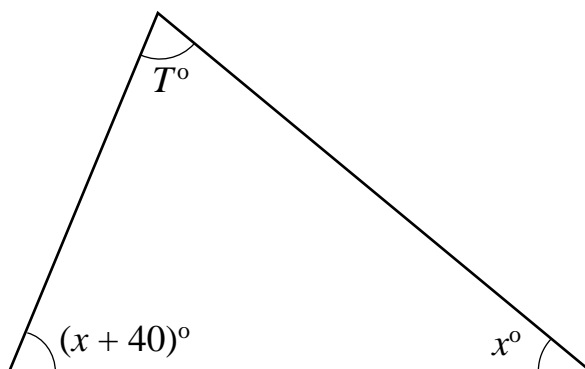
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T is the number you will receive.

A2



The diagram represents a triangle with angles of T° , x° and $(x + 40)^\circ$.

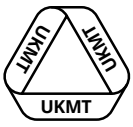
Pass on the value of x .

T is the number you will receive.

A4

$$K = \frac{T}{2} + \frac{T}{3} + \frac{T}{4} + \frac{T}{5} + \frac{T}{6}.$$

Write down the value of K .



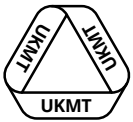
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B1

U , K , M and T are single-digit positive integers.

$$U < K < M < T \text{ and}$$

$$U + K \times M = T.$$

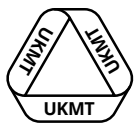
Pass on the sum of the *two* possible values of T .

B3

T is the number you will receive.

The lowest common multiple (LCM) of $3T$ and $4T$ is K greater than the highest common factor (HCF) of $20T$, $30T$ and $50T$.

Pass on the value of K .



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B2

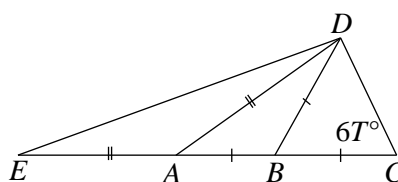
T is the number you will receive.

$$\sqrt{T}(y - 4) = 2\sqrt{T}(8 - y) - 8y.$$

Pass on the value of *y*.

B4

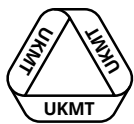
T is the number you will receive.



In the diagram, angle $BCD = 6T^\circ$, $AB = BD = BC$ and $AE = AD$.

Angle DEA is equal to K° .

Write down the value of K .



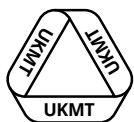
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C1

$$(9 - 8 - 7) \times (6 \times -5 - 4 \times -3) \div (-2 - 1) = -4 \times K.$$

Pass on the value of K .

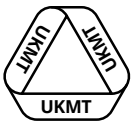
C3

T is the number you will receive.

Aled has a fair four-sided dice. The sides of the dice are marked 2, 3, 6 and 7. He rolls the dice twice and adds the two scores together to give a total.

The probability that Aled's total is greater than T is $\frac{1}{K}$.

Pass on the value of the whole number K .



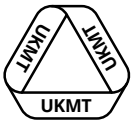
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C2

T is the number you will receive.

$$\frac{3}{4} + \frac{5}{6} \div \frac{7}{8} - \frac{T+2}{T-2} = \frac{K}{84}.$$

Pass on the value of K .

C4

T is the number you will receive.

Five positive integers are written in ascending order. The list has mode T , median $T + 1$, mean $T + 2$ and range $T + 3$.

Write down the mean of the middle three integers in the list.



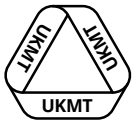
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D1

$$B = \frac{0.12 \times 0.2}{0.003}.$$

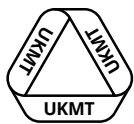
Pass on the value of B .

D3

T is the number you will receive.

The point with coordinates $(T, 12)$ is reflected in the line $x = 10$. Its image has coordinates (a, b) .

Pass on the value of $a + b$.



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D2

T is the number you will receive.

When Antony makes decisions, he goes with his heart 50% more frequently than his head. When Bea makes decisions, she goes with her head twice as frequently as with her heart.

When making decisions last week, Antony and Bea went with their heart the same number of times as each other. Antony went with his head T times, and Bea went with her head B times.

Pass on the value of B .

D4

T is the number you will receive.

The point with coordinates (T, T) is rotated clockwise by 90° about the point $(6, 3)$. Its image has coordinates (a, b) .

Write down the value of $a - b$.

TEAM NUMBER

SCHOOL NAME

<p>A1</p> <p style="text-align: right;">0 1 3</p>	<p>B1</p> <p style="text-align: right;">0 1 3</p>	<p>C1</p> <p style="text-align: right;">0 1 3</p>	<p>D1</p> <p style="text-align: right;">0 1 3</p>
<p>A2</p> <p style="text-align: right;">0 1 3</p>	<p>B2</p> <p style="text-align: right;">0 1 3</p>	<p>C2</p> <p style="text-align: right;">0 1 3</p>	<p>D2</p> <p style="text-align: right;">0 1 3</p>
<p>A3</p> <p style="text-align: right;">0 1 3</p>	<p>B3</p> <p style="text-align: right;">0 1 3</p>	<p>C3</p> <p style="text-align: right;">0 1 3</p>	<p>D3</p> <p style="text-align: right;">0 1 3</p>
<p>A4</p> <p style="text-align: right;">0 1 3</p>	<p>B4</p> <p style="text-align: right;">0 1 3</p>	<p>C4</p> <p style="text-align: right;">0 1 3</p>	<p>D4</p> <p style="text-align: right;">0 1 3</p>

BONUS 3

BONUS 3

BONUS 3

BONUS 3

A TOTAL /15

B TOTAL /15

C TOTAL /15

D TOTAL /15

Circle the mark awarded for each question and cross out the others.
 At the end of the round, either circle the bonus mark or cross it out.

FINAL SCORE /60