Year 7 Mathematics Challenge 2021

Heats, Tuesday 4th to Thursday 6th May 2021

via *Livestorm*

William Thallon

Teaching and Learning Adviser (Secondary Maths)

David Cook

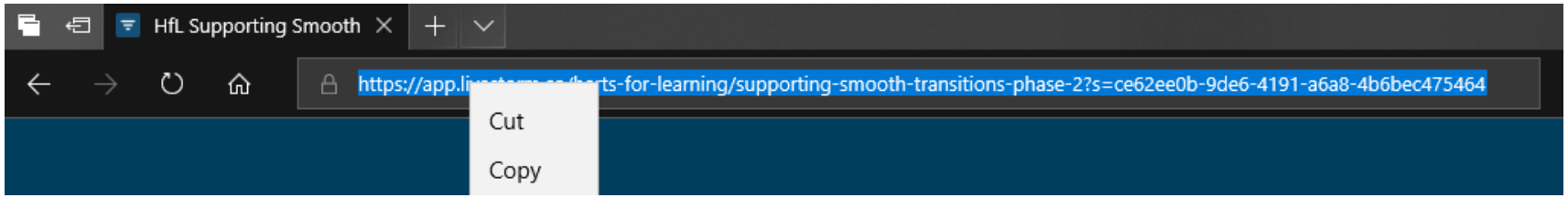
Lead Teaching and Learning Adviser (Primary Maths)

@HfLSecMaths

Herts for Learning

Housekeeping: Connecting

- Please join using **Google Chrome, Firefox** or **Safari**
- If you are in **Microsoft Edge** and want to use a different browser, copy the address in the address bar, open the other browser and paste the address into the address bar there:



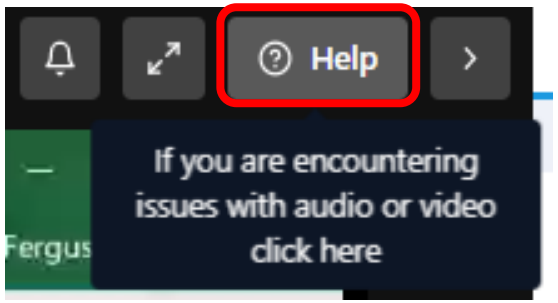
- If you lose connection, or have an issue with sound, or it feels like something has ‘stuck’, refresh your web browser’s page (Ctrl-R, the F5 key, or click the appropriate ‘refresh’ or ‘reload’ button in your web browser).
- **This session is being recorded**

Taking Part

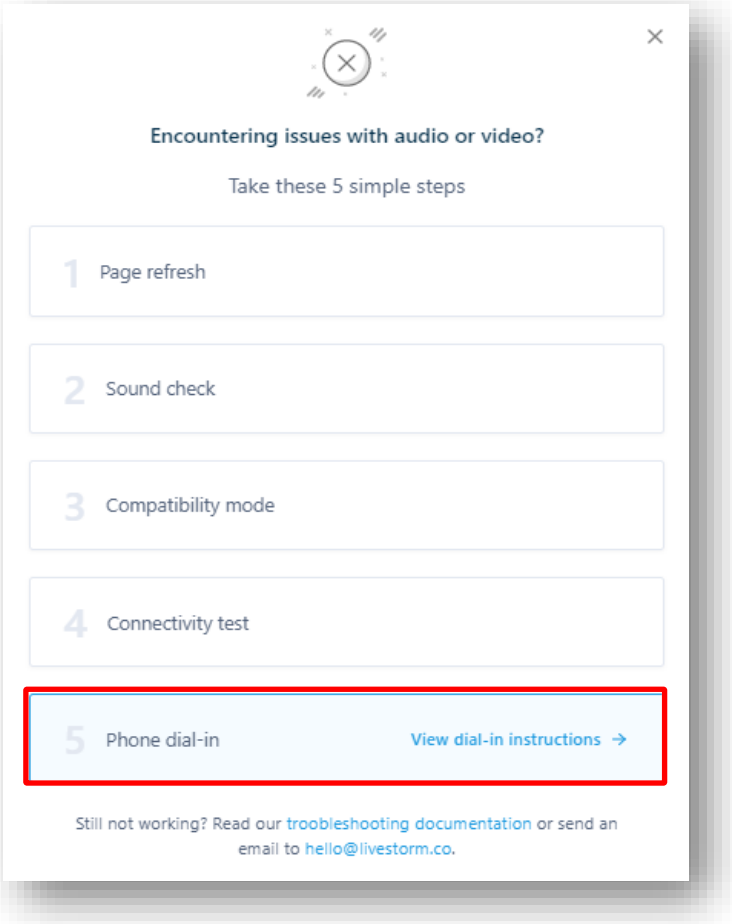
- Please remember we **cannot** hear or see you
- Please use the panels to the **right** - Chat for general comments and questions

Making sure you can hear

- If you're not getting sound through your computer, check your speakers / headphones are on and plugged in!
- You can listen on the phone **+44 800 060 8942** and the six-digit code discoverable below
- To see the code yourself **click the Help button** at the top right of the webinar:



- Run the checks – if still needed the **dial-in details (including the six-digit code) are in step 5:**



Split screen

Mute or unmute notification sounds

Switch to/from fullscreen mode

Non-split screen

Show the Chat / Questions / Polls panel again

Red dot indicates new chat, question or poll available

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The Four Rounds

Round 1 General Maths questions

Round 2 Memory Round

Round 3 Estimation Round

Round 4 General Maths questions

60 marks for each round.

Preliminaries

- You should have pens or pencils, rubbers, and rough working out paper only.
- No calculators, no measuring equipment, and no use of computers, phones, Internet etc!
- Your teacher has been sent a spreadsheet to record your answers. This should be returned by e-mail at the end.

Herts for Learning

Round 1

General Mathematics Questions

Herts for Learning

Round 1

Question 1

In this sequence, the difference between each term is the same.

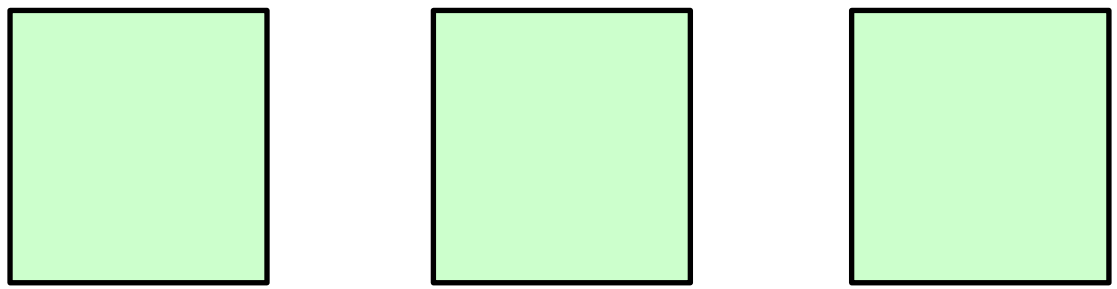
11 14 17 20 23 …

What is the 20th number in the sequence?

Round 1

Question 2

Three numbers have a **range** of **6**, a **mean** of **9** and a **median** of **11**.



What are the three numbers?

Round 1

Question 3

Write the numbers from 111 to 115 in the five boxes so that they satisfy the descriptions.

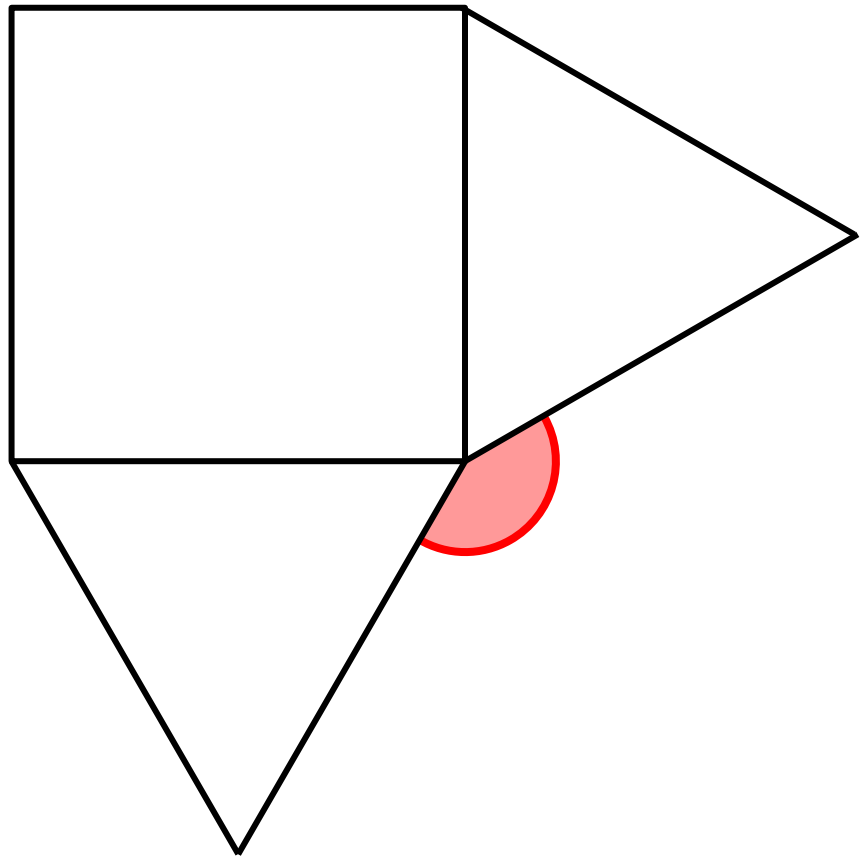
Each of the numbers should appear **exactly once**.

Ten less than a cube number	Ten less than a square number	Prime number	Multiple of 7	Multiple of 6

Round 1

Question 4

The diagram shows two equilateral triangles and a square.



What is the size of the red angle?

Round 1

Question 5

A

£1.20 for 150 g

B

250 g costs £3.00

Work out the **total cost** of 100 g of cheese **A** and 200 g of cheese **B**.

Round 1

Question 6

63.788	
Rounded to the nearest ten	*A*
Rounded to the nearest whole number	*B*
Rounded to one decimal place	*C*
Rounded to two decimal places	*D*

Write the numbers *A*, *B*, *C* and *D* in order, starting with the **smallest**.

End of Round 1

Round 1

ANSWERS

Round 1 **Question 1**

In this sequence, the difference between each term is the same.

11 14 17 20 23 ...

What is the 20th number in the sequence?

68

Round 1 **Question 2**

Three numbers have a **range** of **6**, a **mean** of **9** and a **median** of **11**.

What are the three numbers?

5 , 11, 11

Round 1 **Question 3**

Write the numbers from 111 to 115 in the five boxes so that they satisfy the descriptions.

Each of the numbers should appear **exactly once**.

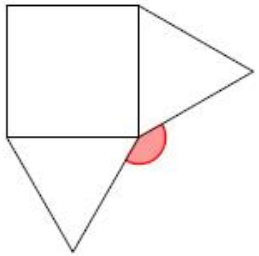
Ten less than a cube number	Ten less than a square number	Prime number	Multiple of 7	Multiple of 6

115, 111, 113, 112, 114

Round 1 **Question 4**

The diagram shows two equilateral triangles and a square.

What is the size of the red angle?



150°

Round 1 **Question 5**

A

£1.20 for 150 g

B

250 g costs £3.00

Work out the **total cost** of 100 g of cheese **A** and 200 g of cheese **B**.

£3.20

Round 1 **Question 6**

63.788	
Rounded to the nearest ten	*A*
Rounded to the nearest whole number	*B*
Rounded to one decimal place	*C*
Rounded to two decimal places	*D*

Write the numbers *A*, *B*, *C* and *D* in order, starting with the **smallest**.

ADBC

Round 2

Memory Round

Herts for Learning

Memory Round

We are going to show a mathematical poster to two members of the team (the **observers**).

The other two members of the team (the **scribes**) will not see the poster. The observers must describe the poster from memory, and the scribes must draw it.

The observers are not allowed to draw the poster, or make notes when they are looking at the poster.

When describing the poster, observers must use words only. They are not allowed to draw anything, or use their hands in any way.

Memory Round

The poster will be shown on the screen. The scribes must go into a different room, so they cannot see it.

The observers will have **four** chances to view the poster.

30 seconds to view
2 minutes to go and describe

30 seconds to view
2 minutes to describe

30 seconds to view
2 minutes to describe

30 seconds to view
2 minutes to describe

Scribes can draw at any time during the whole period.

Memory Round

Note to supervising teachers

Each showing of the poster will be preceded by a 30-second warning, so that the observers can get themselves into position.

At the end, the finished poster should be photographed or scanned and sent in by e-mail.

(E-mail address to follow at end of round.)

Memory Round

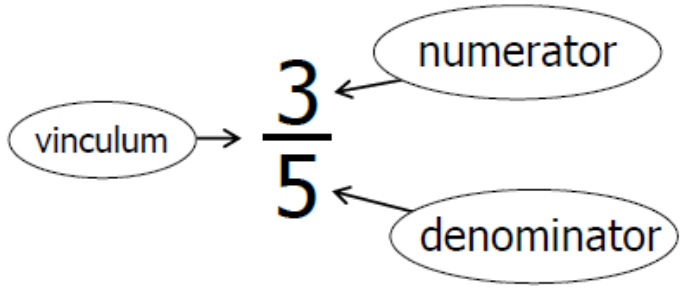
Pencils and rubbers only. No rulers or other drawing equipment.

You now have one minute to decide who will be the observers and who will be the scribes … and to get into position!

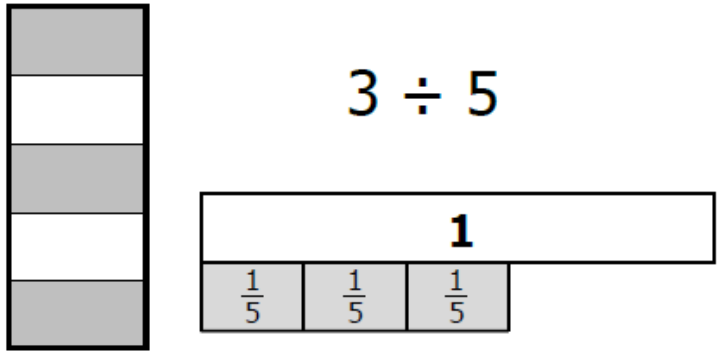
Memory Round

Poster about to be displayed for the first time.

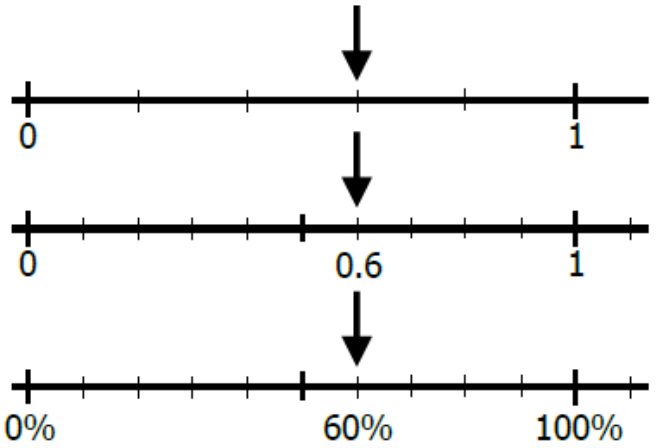
Fractions



Fractions where the numerator is greater than the denominator are called **improper**: $\frac{11}{8}$ $\frac{33}{32}$



$3 \div 5$



$$\frac{3}{5} = \frac{6}{10} = \frac{9}{15} = \frac{12}{20} = \ldots = \frac{3n}{5n}$$

Any number that can be expressed as a fraction is called a **rational number**.

Some numbers, such as π and $\sqrt{2}$, cannot be expressed as fractions. They are called **irrational** numbers.

Integers are fractions with an 'invisible denominator' of 1: $4 = \frac{4}{1}$ $12 = \frac{12}{1}$

Swapping the numerator and denominator gives the **reciprocal**:

Number	$\frac{3}{5}$	4	$\frac{1}{6}$
Reciprocal	$\frac{5}{3}$	$\frac{1}{4}$	6

The fifth **Farey Sequence**

$$\frac{0}{1} \quad \frac{1}{5} \quad \frac{1}{4} \quad \frac{1}{3} \quad \frac{2}{5} \quad \frac{1}{2} \quad \frac{3}{5} \quad \frac{2}{3} \quad \frac{3}{4} \quad \frac{4}{5} \quad \frac{1}{1}$$

all the different fractions that can be made from the numbers from 0 to 5, arranged in order

Round 2

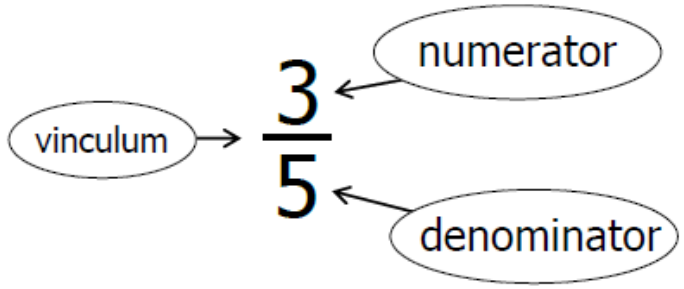
Memory Round

Herts for Learning

Memory Round

Second viewing of poster coming up!

Fractions



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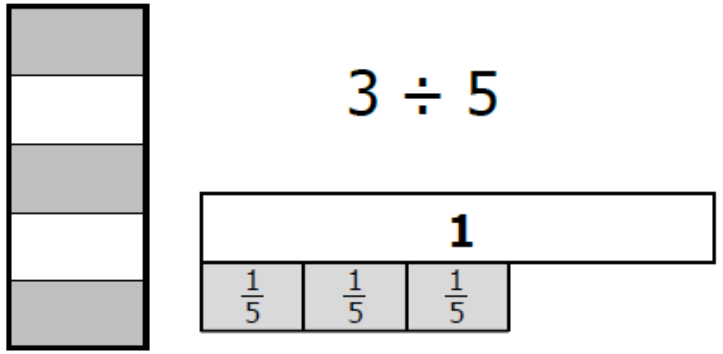

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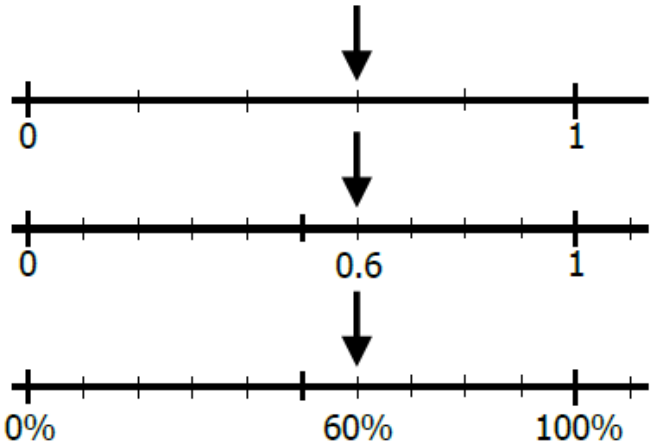

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The fifth **Farey Sequence**

$$\frac{0}{1} \quad \frac{1}{5} \quad \frac{1}{4} \quad \frac{1}{3} \quad \frac{2}{5} \quad \frac{1}{2} \quad \frac{3}{5} \quad \frac{2}{3} \quad \frac{3}{4} \quad \frac{4}{5} \quad \frac{1}{1}$$

all the different fractions that can be made from the numbers from 0 to 5, arranged in order

Round 2

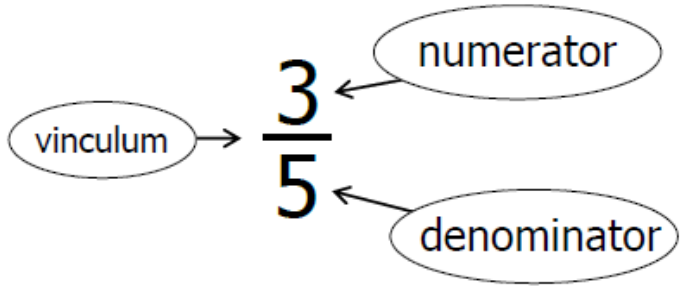
Memory Round

Herts for Learning

Memory Round

Third viewing of poster coming up!

Fractions



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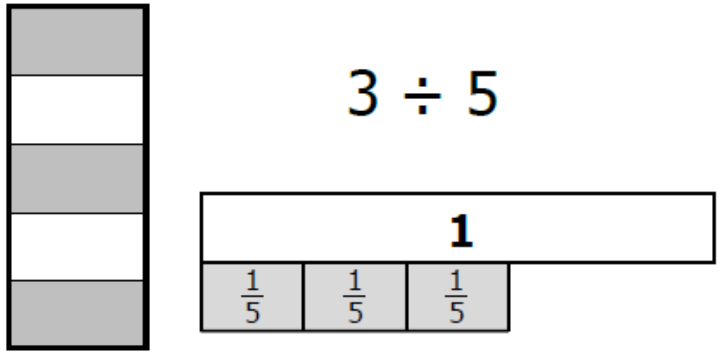

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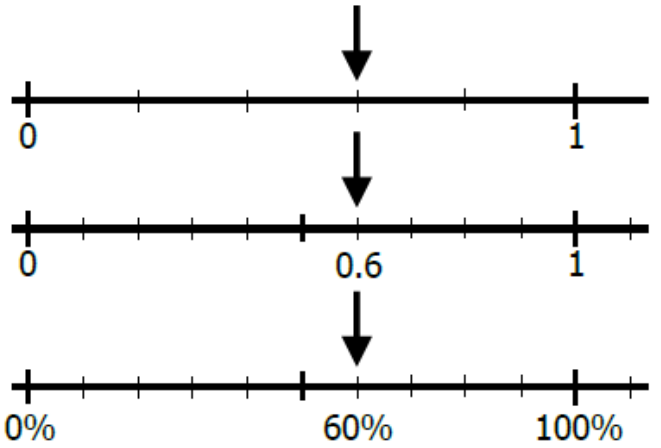

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The fifth **Farey Sequence**

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Round 2

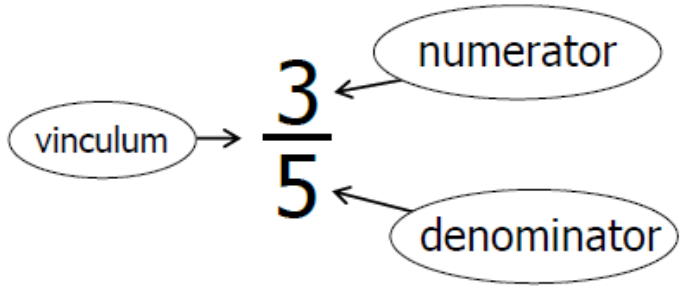
Memory Round

Herts for Learning

Memory Round

Fourth and final viewing of poster coming up!

Fractions



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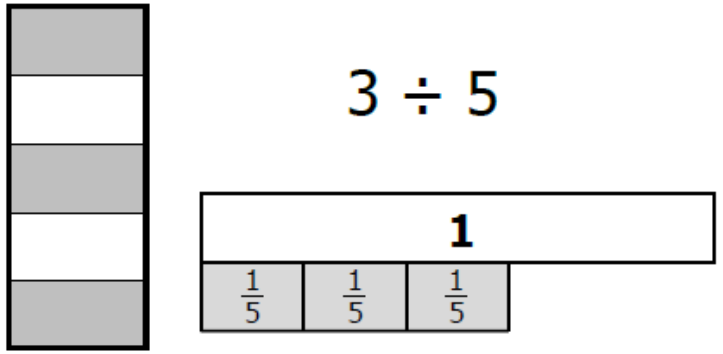

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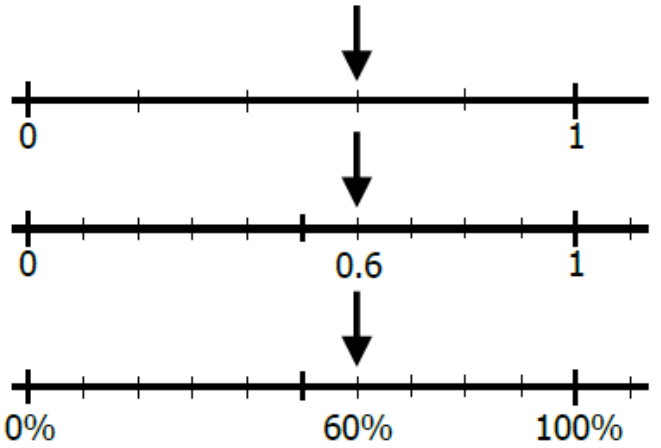

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The fifth **Farey Sequence**

$$\frac{0}{1} \quad \frac{1}{5} \quad \frac{1}{4} \quad \frac{1}{3} \quad \frac{2}{5} \quad \frac{1}{2} \quad \frac{3}{5} \quad \frac{2}{3} \quad \frac{3}{4} \quad \frac{4}{5} \quad \frac{1}{1}$$

all the different fractions that can be made from the numbers from 0 to 5, arranged in order

Round 2

Memory Round

Herts for Learning

Memory Round

Time's up!

Everyone should now come back into the main room.

Please photograph or scan the finished poster, and e-mail it to:

david.cook@hertsforlearning.co.uk

End of Round 2

Round 3

Estimation Round

Herts for Learning

Round 3

Question 1

Estimate the answer to this calculation:

$$\frac{4{,}891}{0.62 \times 178}$$

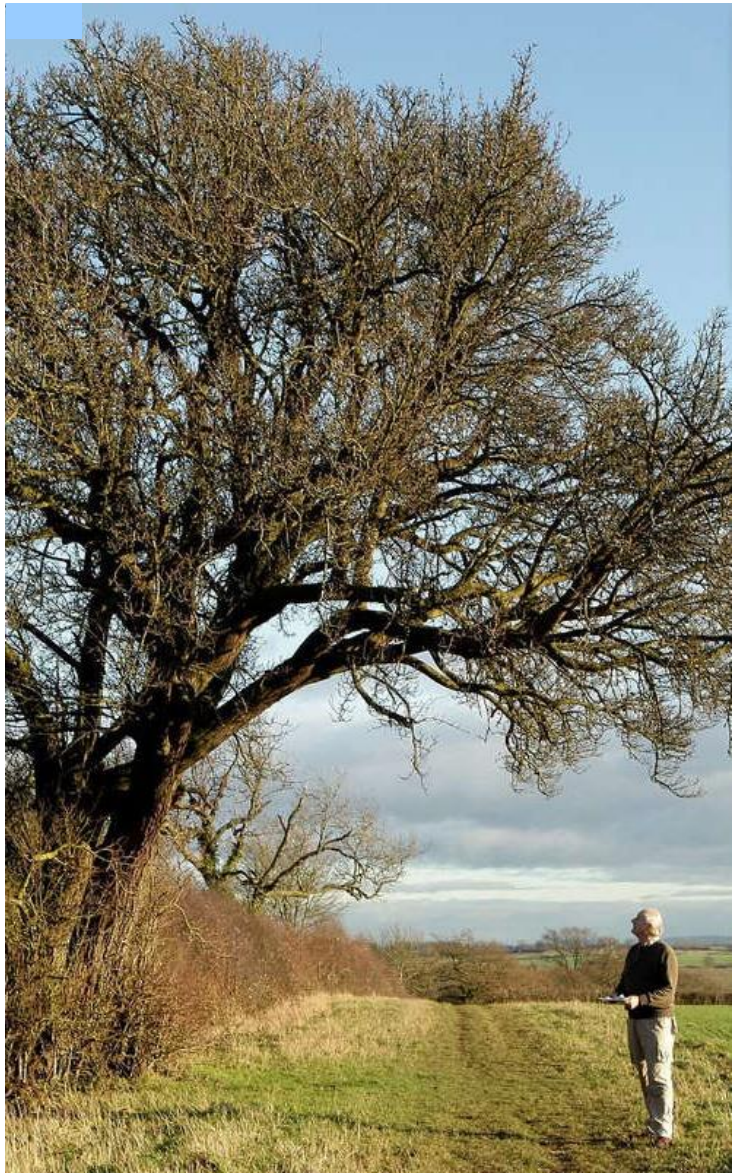
Give the answer to the nearest whole number.

Round 3

Question 2

An adult of average height is standing next to a tree.

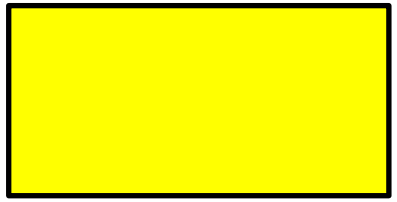
Estimate the height of the tree, in metres.

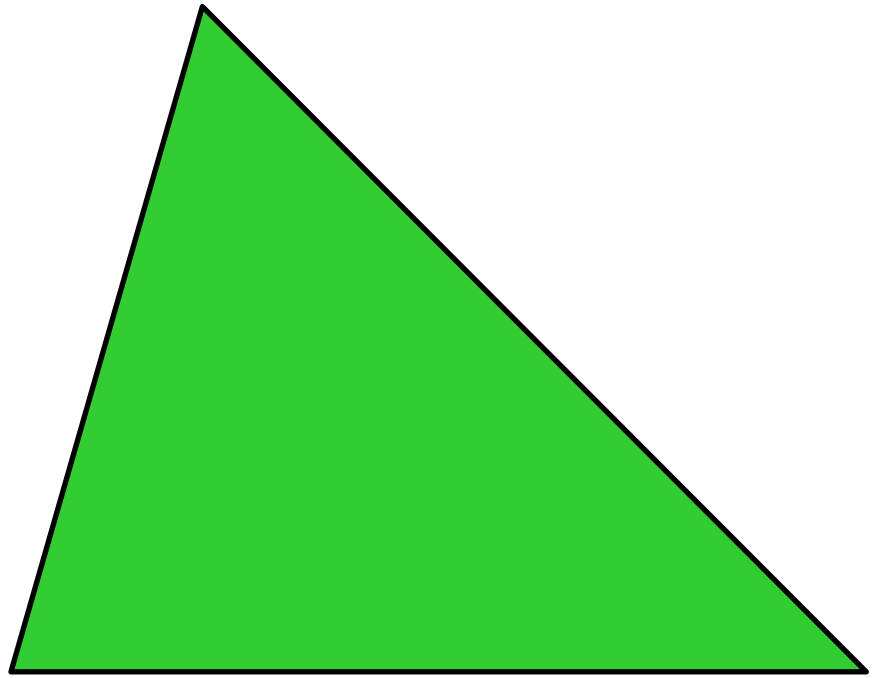


Round 3

Question 3

The yellow rectangle and green triangle are drawn to the same scale.



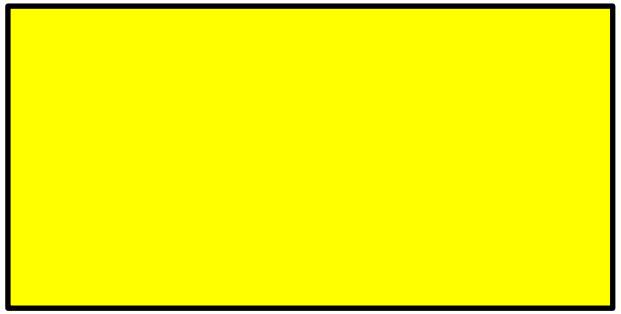


The area of the rectangle is 20 cm².

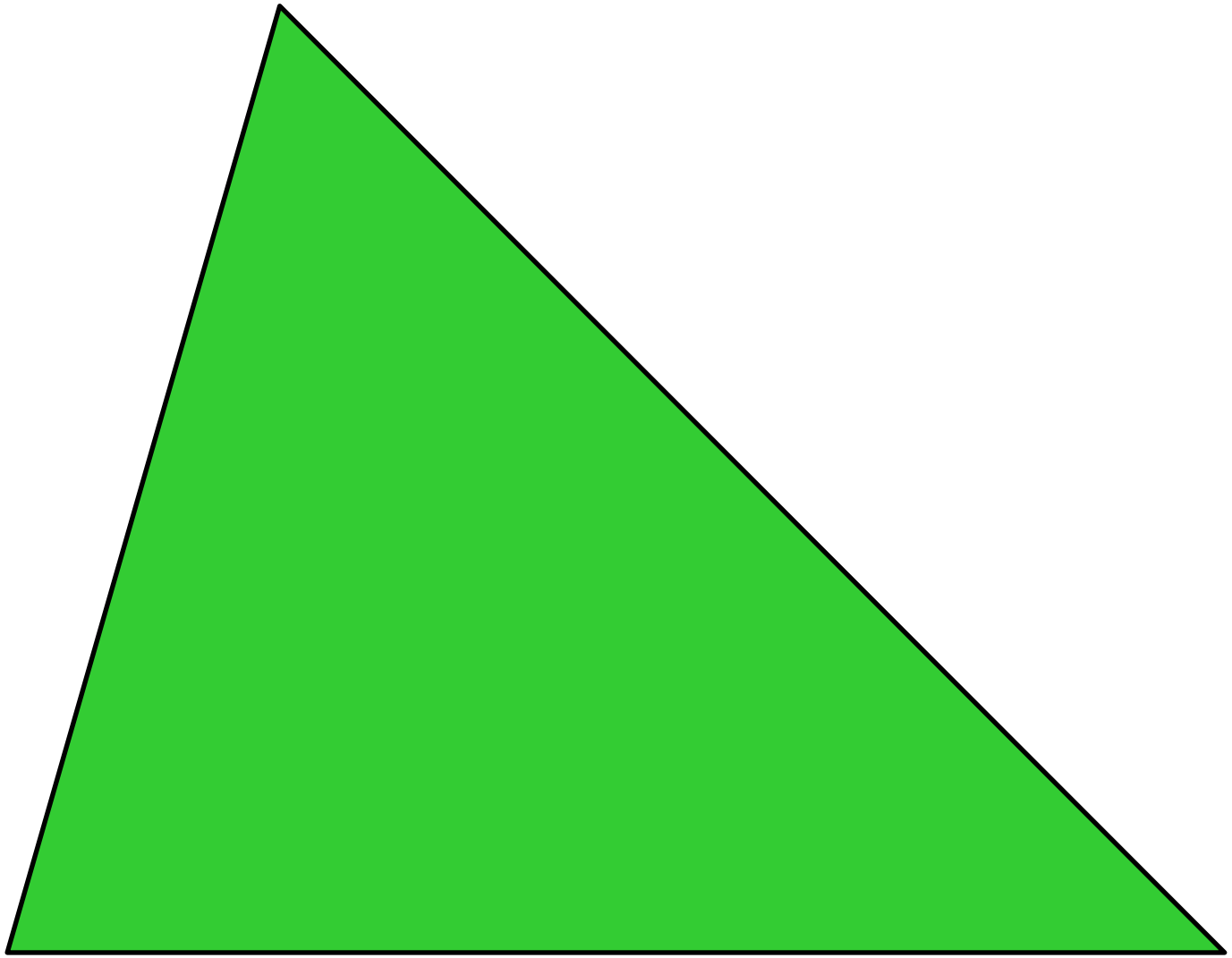
Estimate the area of the triangle, in cm².

Round 3

Question 3



20 cm²



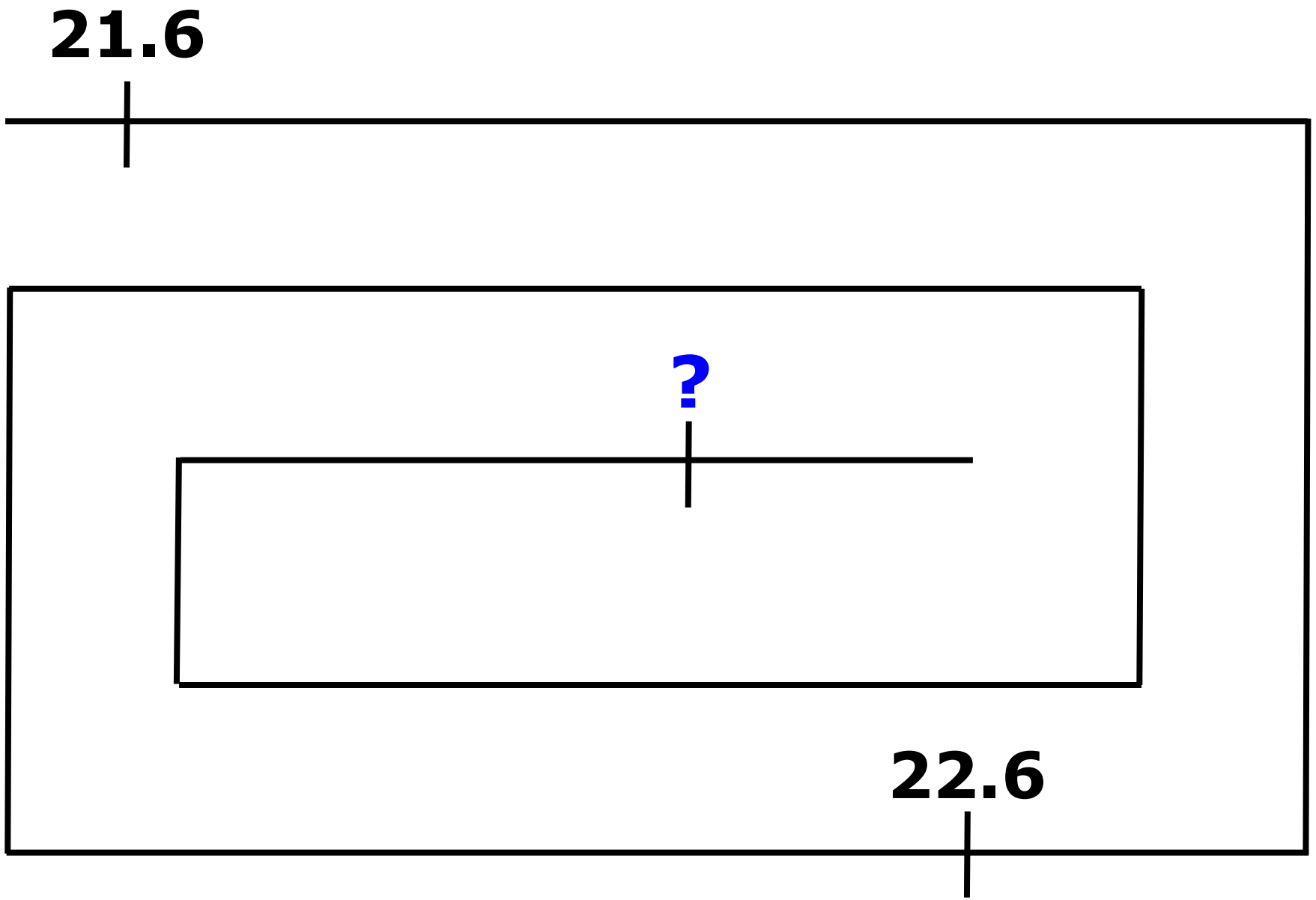
Round 3

Question 4

What number is represented by the '**?**' on this number line?

Round 3

Question 4

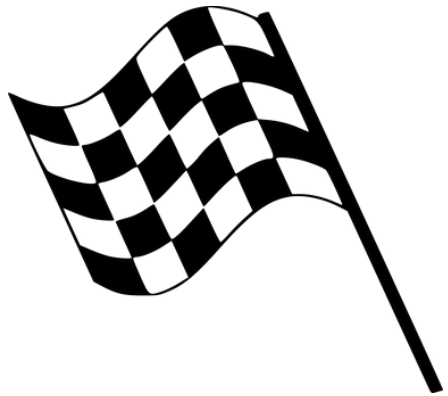


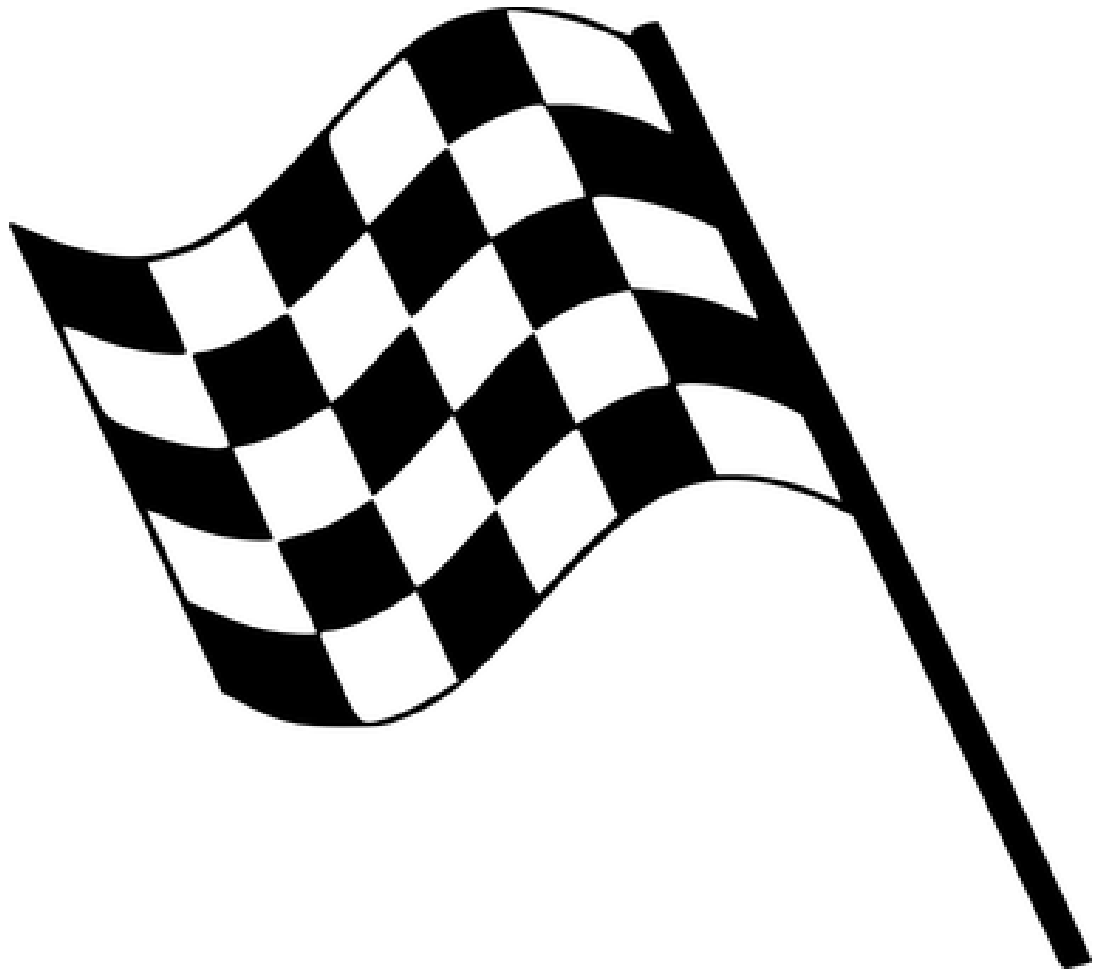
Round 3

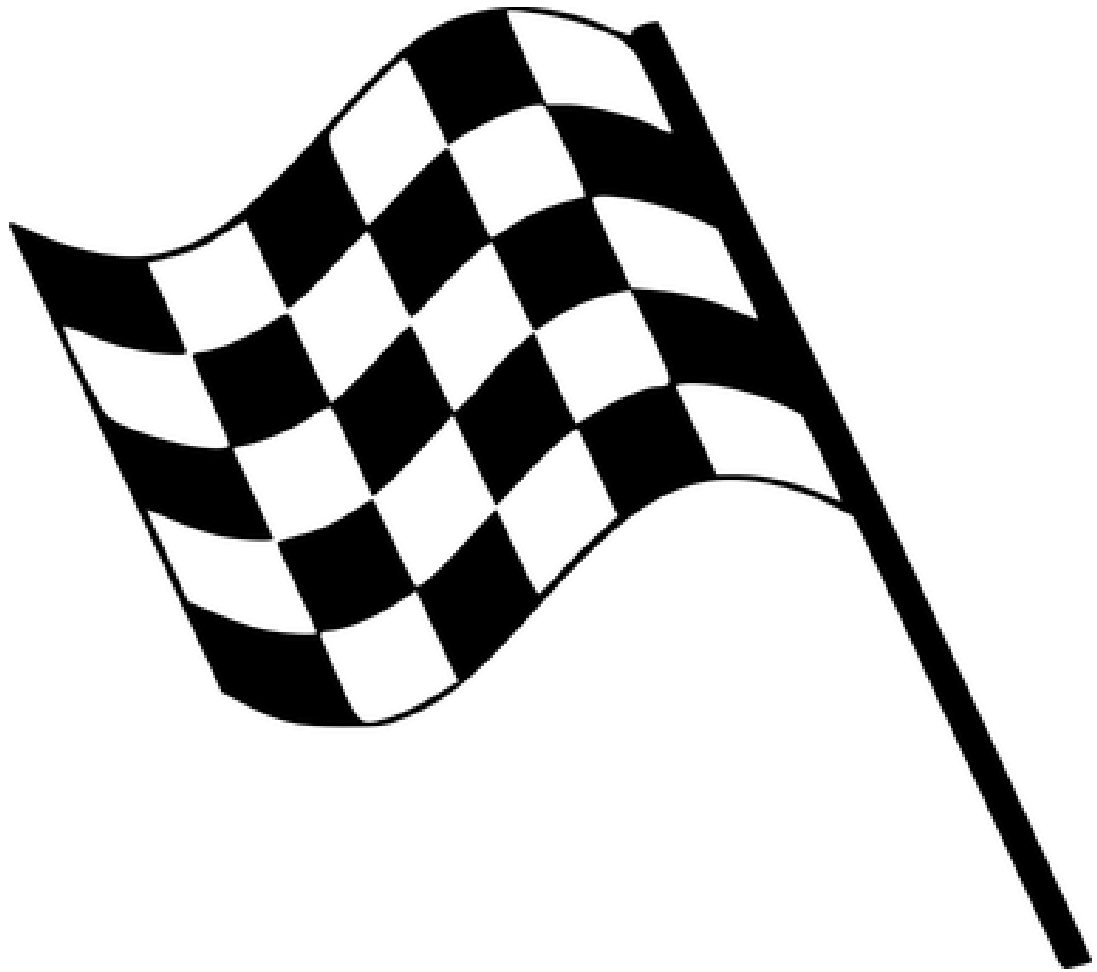
Question 5

Here is a chequered flag.

It will disappear and then re-appear.
To the nearest second, estimate for how long it disappears.







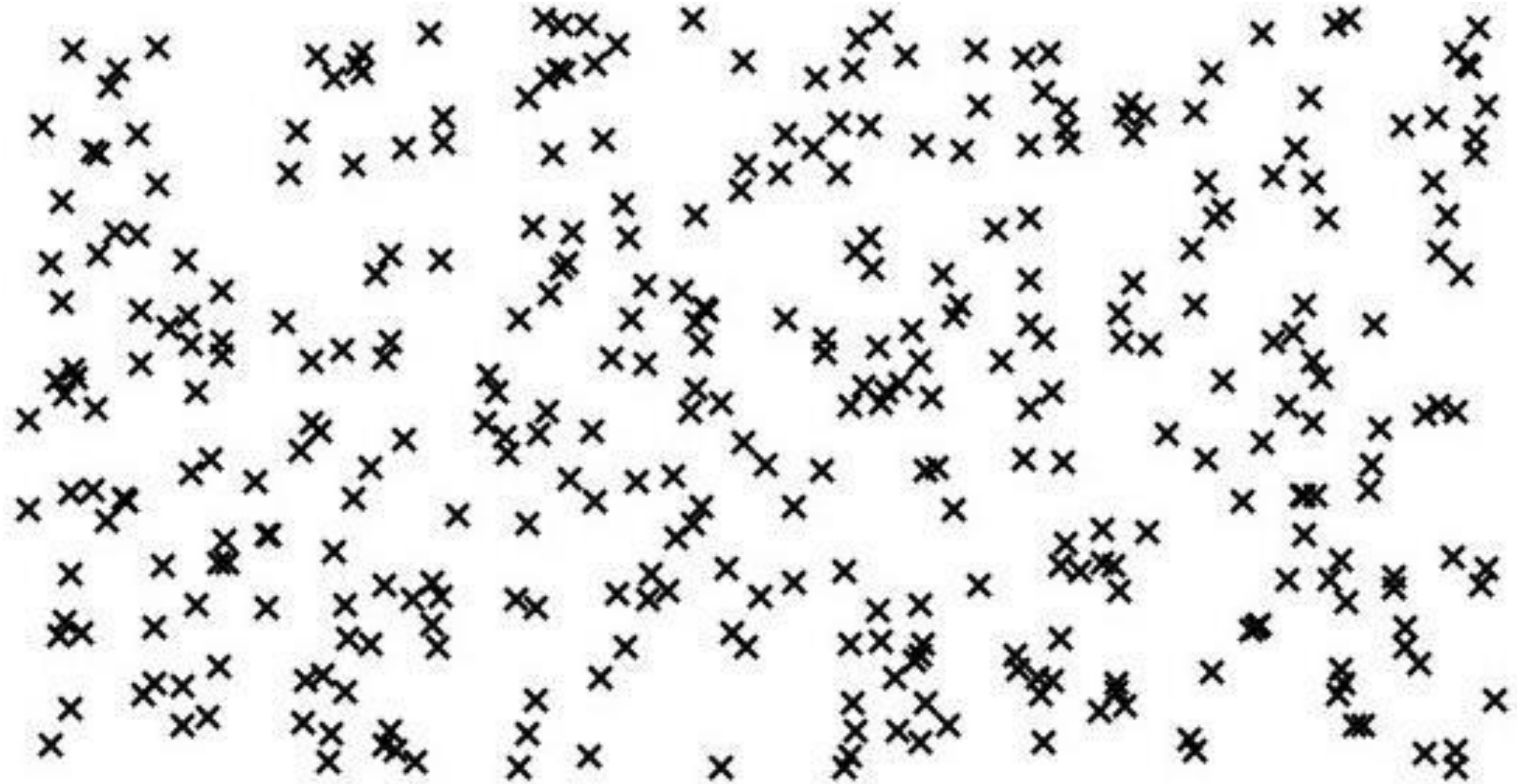
Round 3

Question 6

Estimate the number of crosses on the next slide.

Round 3

Question 6



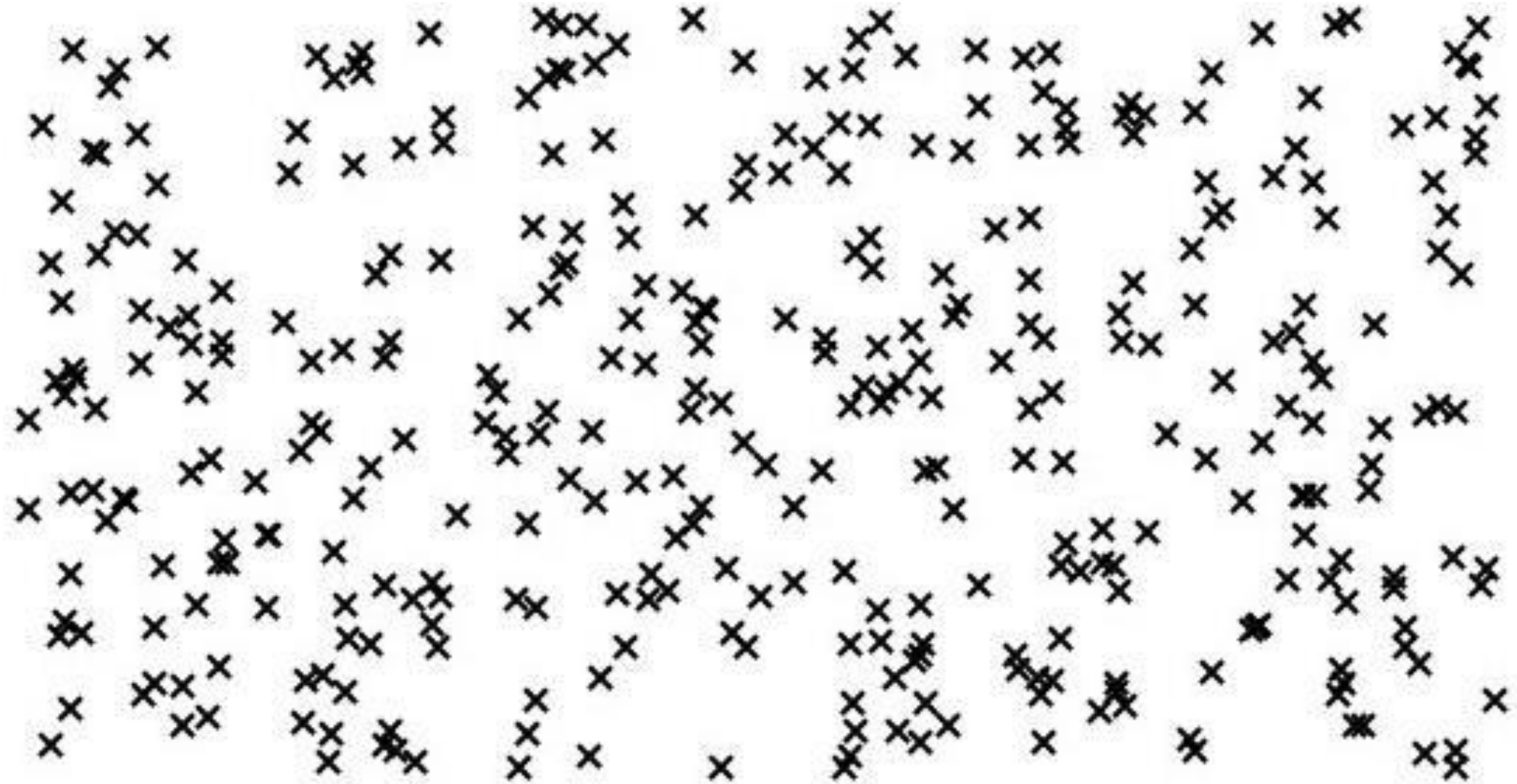
Round 3

Question 6

Estimate the number of crosses on the next slide.

Round 3

Question 6



End of Round 3

Round 3

ANSWERS

Round 3 **Question 1**

Estimate the answer to this calculation:

$$\frac{4{,}891}{0.62 \times 178}$$

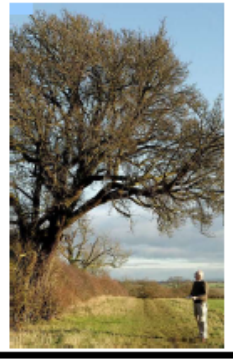
Give the answer to the nearest whole number.

42 to 47

Round 3 **Question 2**

An adult of average height is standing next to a tree.

Estimate the height of the tree, in metres.

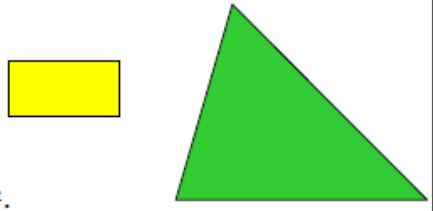


6.9 to 9.3 m

Round 3 **Question 3**

The yellow rectangle and green triangle are drawn to the same scale.

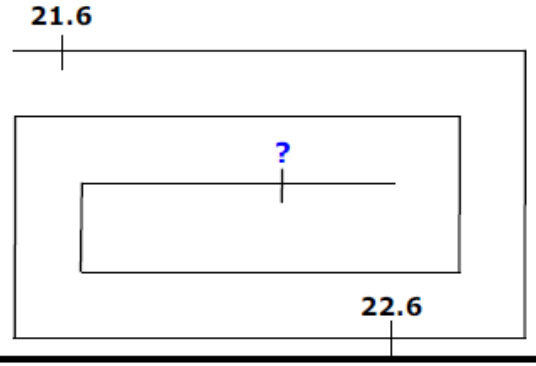
The area of the rectangle is 20 cm².



Estimate the area of the triangle, in cm².

77.5 to 80 cm²

Round 3 **Question 4**



24.5 to 24.9

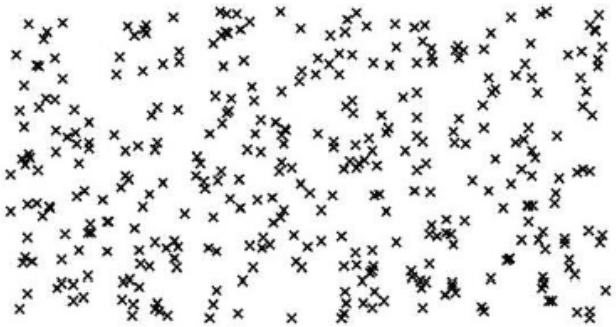
Round 3 **Question 5**

Here is a chequered flag.

It will disappear and then re-appear.
To the nearest second, estimate for how long it disappears.

45 to 47 seconds

Round 3 **Question 6**



353 to 363

Round 4

General Mathematics Questions

Herts for Learning

Round 4

Question 1

P and **Q** are whole numbers.

- The highest common factor of **P** and **Q** is **2**.
- The lowest common multiple of **P** and **Q** is **24**.

What are **P** and **Q**?

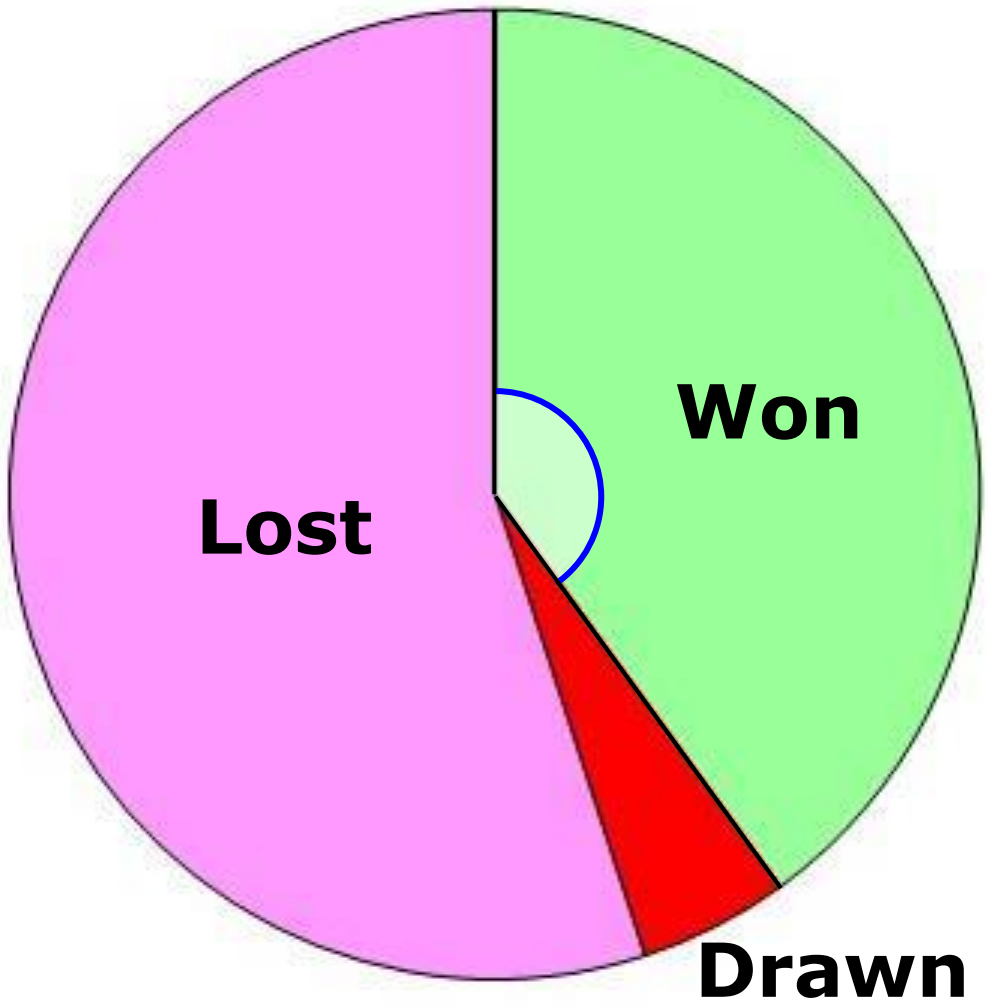
Round 4

Question 2

The pie chart shows the results of a football team in the 2018/19 season.

The team won 40% of their matches.

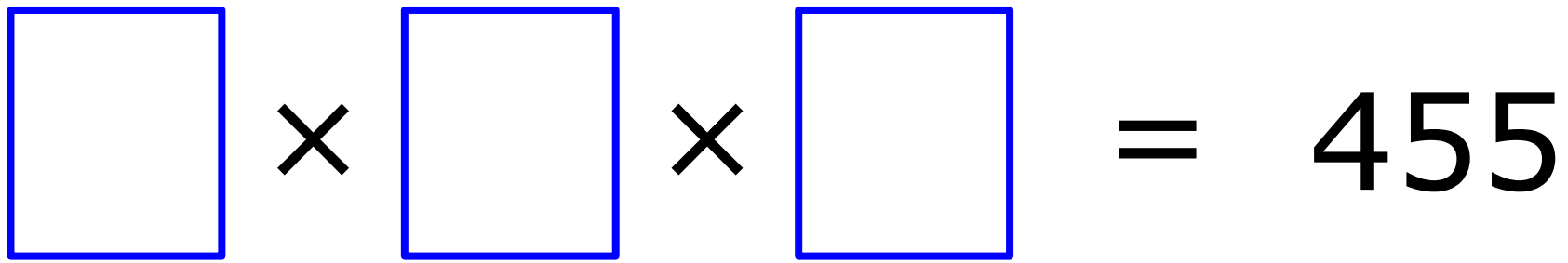
What is the angle of the green sector?



Round 4

Question 3

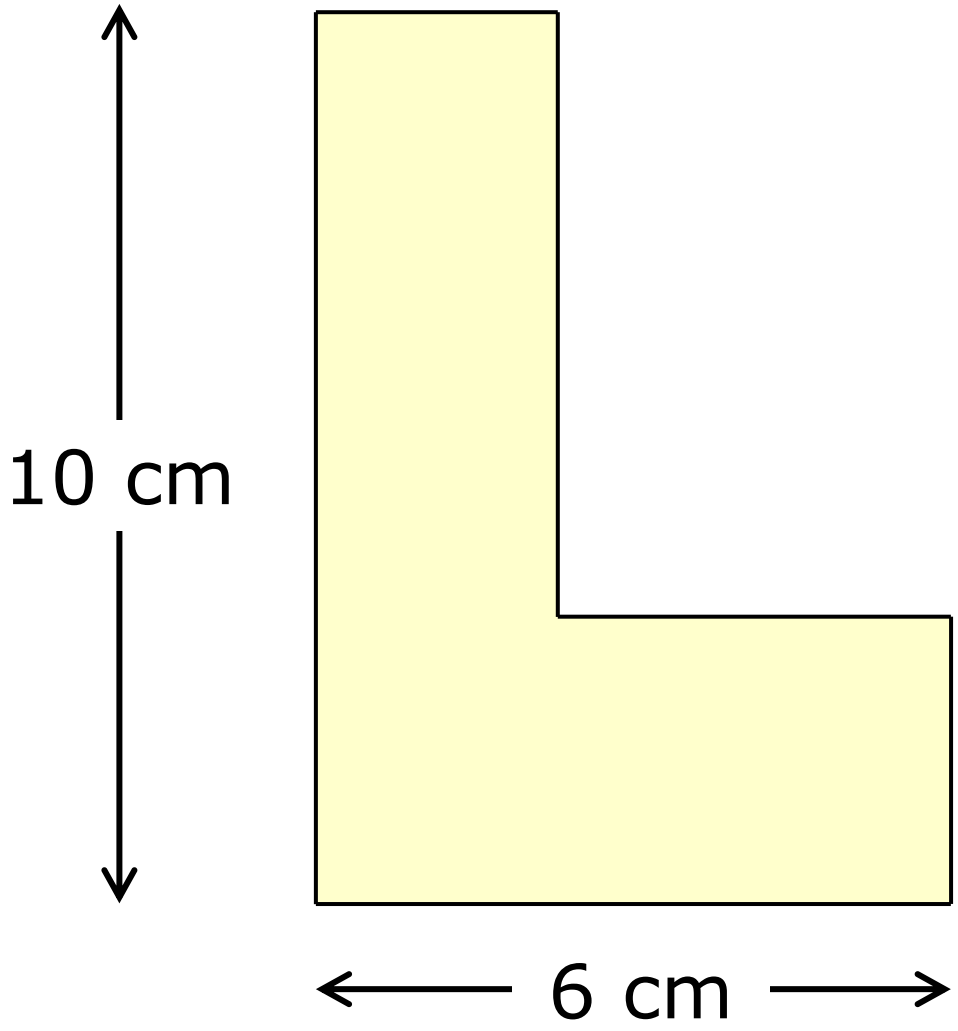
The numbers in the boxes are **different** whole numbers, each **greater than 1**.



What are the three numbers?

Round 4

Question 4



Work out the perimeter of this L-shape.

Round 4

Question 5

At the moment, Dwayne is 4 times older than Layla.

In ten years' time, Dwayne will be twice as old as Layla.

How many years old is Layla now?

Round 4

Question 6

Annabel, Bradley and Carl win some money.

$\frac{2}{5}$ of the money goes to Annabel.

The remainder is shared between Bradley and Carl in the ratio 5 : 1.

Bradley's share is £45.

What is Annabel's share of the money?

End of Round 4

Year 7 Mathematics Challenge Final 2020

Please finalise your answer spreadsheet as quickly as possible.

Please include the school/team name in the file name, and e-mail it to:

william.thallon@hertsforlearning.co.uk

Round 4

ANSWERS

Round 4 **Question 1**

P and **Q** are whole numbers.

- The highest common factor of **P** and **Q** is **2**.
- The lowest common multiple of **P** and **Q** is **24**.

What are **P** and **Q**?

6, 8

Round 4 **Question 2**

The pie chart shows the results of a football team in the 2018/19 season.

The team won 40% of their matches.

What is the angle of the green sector?

144°

Round 4 **Question 3**

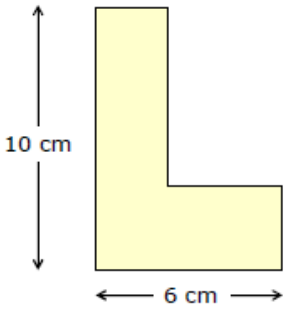
The numbers in the boxes are **different** whole numbers, each **greater than 1**.

□ × □ × □ = 455

What are the three numbers?

5, 7, 13

Round 4 **Question 4**



Work out the perimeter of this L-shape.

32

Round 4 **Question 5**

At the moment, Dwayne is 4 times older than Layla.

In ten years' time, Dwayne will be twice as old as Layla.

How many years old is Layla now?

5

Round 4 **Question 6**

Annabel, Bradley and Carl win some money.

$\frac{2}{5}$ of the money goes to Annabel.

The remainder is shared between Bradley and Carl in the ratio 5 : 1.

Bradley's share is £45.

What is Annabel's share of the money?

£36

Year 7 Mathematics Challenge Final 2020

Marking in progress

Well done to all

Year 7 Mathematics Challenge 2021

Heats, Tuesday 4th to Thursday 6th May 2021

via *Livestorm*

William Thallon

Teaching and Learning Adviser (Secondary Maths)

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Herts for Learning