# YEAR 7 MATHEMATICS CHALLENGE

Heats 2026, *Online*

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HFL Education

# 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!
- Decide on a team name. It should include the name of your school (e.g. Leventhorpe Team A).
- Don't leave any answers blank. 'Near misses' or partially correct answers may score points.

# PRELIMINARIES

- Your teacher has been sent a link to an *online* sheet to record your answers.  If possible, this should be updated at the end of each round.
- Teachers:  please check that the link works, and enter the names of your teams during Round 1.

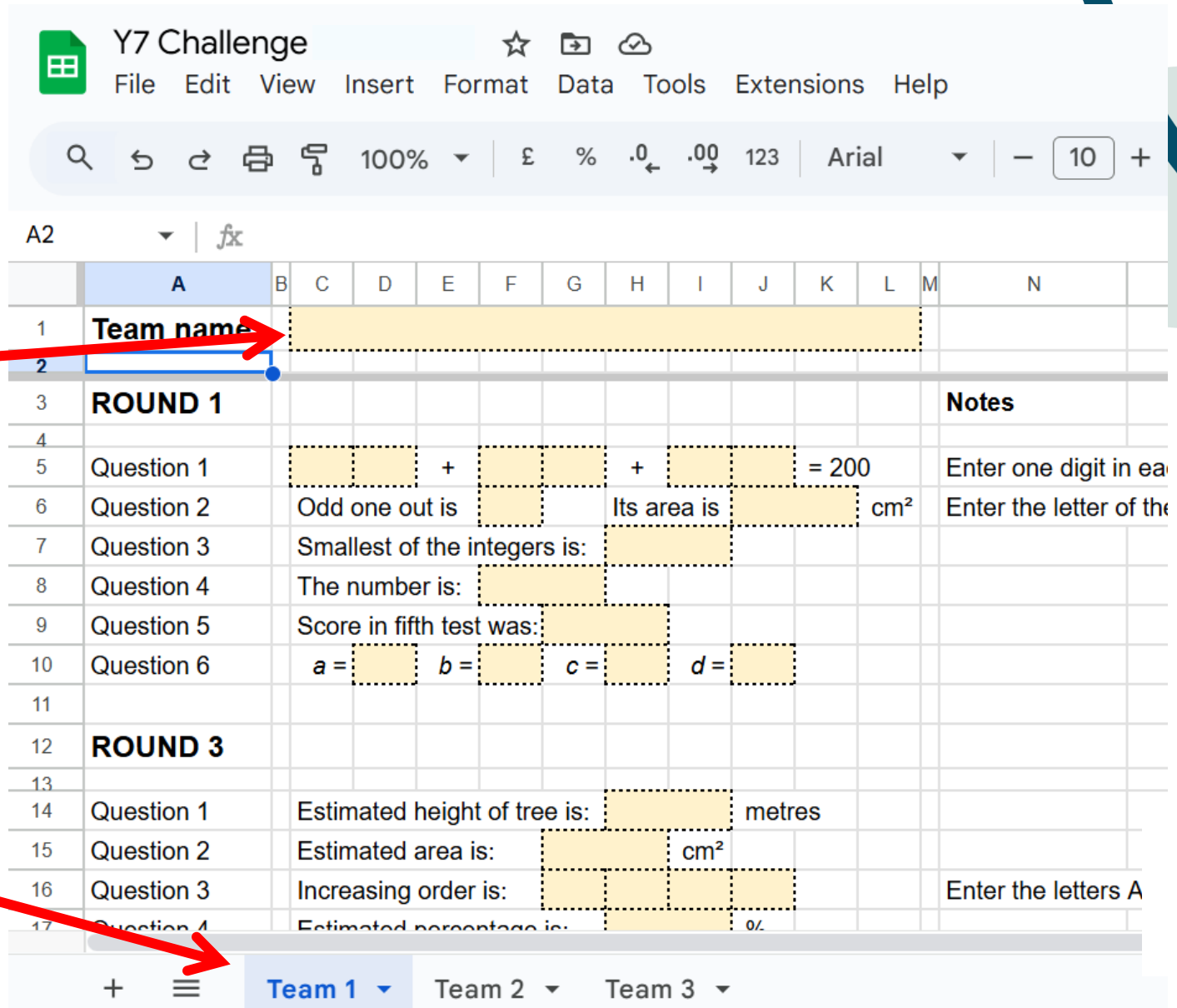
# *ONLINE* SHEET

Enter in the yellow cells only.

Team name at the top.

Scroll down for Rounds 3 and 4.

Separate tab for each team.
(Please do **not** delete unneeded tabs.)



# FORMAT OF CHALLENGE

| | |
|---|---|
| Round 1 | General Maths questions |
| Round 2 | Memory Round |
| Round 3 | Estimation Round |
| Round 4 | General Maths questions |

**60 marks for each round**

Round 1

# General Mathematics Questions

**90 seconds for each question**

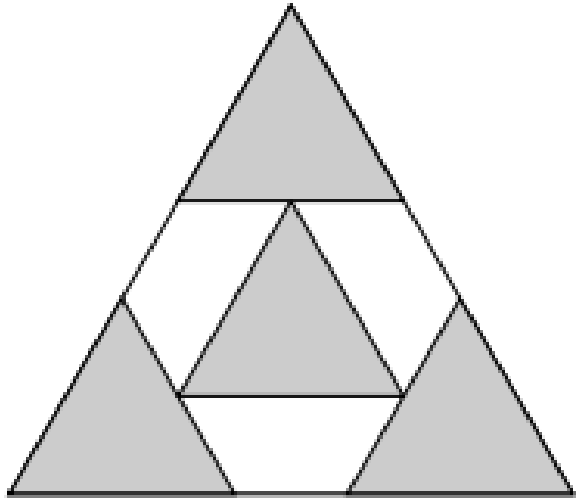
# ROUND 1, QUESTION 1

What two **consecutive** numbers multiply to make 600:

$\square \times \square = 600$

# ROUND 1, QUESTION 2

Four equilateral triangles of the same size are arranged with horizontal bases inside a larger equilateral triangle, as shown. What fraction of the area of the larger triangle is covered by the smaller triangles?



**A** $= \frac{2}{3}$ **B** $= \frac{1}{2}$ **C** $= \frac{4}{9}$ **D** $= \frac{4}{7}$ **E** $= \frac{16}{25}$

# ROUND 1, QUESTION 3

$$1 \quad \div \quad \square \quad = 25$$

Give your answer as a decimal

# ROUND 1, QUESTION 4

What are the next two terms in this sequence?

$2a+b, \frac{7}{2}a+5b, 5a+9b,$ ☐, ☐

# ROUND 1, QUESTION 5

The sum of the ages of 5 teachers is 190.

The mean age of the teachers is 10 years greater than the median age. The modal age is 5 years less than the median age. One of the teachers is 56 years old.

How old are the other four teachers?

# ROUND 1, QUESTION 6

I am thinking of a number:

- It is a 2-digit number.
- It is between 60 and 80.
- The tens digit is 2 more than the ones digit.
- It is not 64.

What number am I thinking of?

# End of Round 1

Please finalise your answers, and pass them to your teachers for entry onto the *online answer* sheet.

# ANSWERS TO ROUND 1

## ROUND 1, QUESTION 1

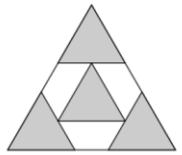
What two **consecutive** numbers multiply to make 600:

$\square$ x $\square$ = 600

**24x25**

## ROUND 1, QUESTION 2

Four equilateral triangles of the same size are arranged with horizontal bases inside a larger equilateral triangle, as shown. What fraction of the area of the larger triangle is covered by the smaller triangles?



A = $\frac{2}{3}$ B = $\frac{1}{2}$ C = $\frac{4}{9}$ D = $\frac{4}{7}$ E = $\frac{16}{25}$

**E = $\frac{16}{25}$**

## ROUND 1, QUESTION 3

1 ÷ $\square$ = 25

Give your answer as a decimal

**0.04**

## ROUND 1, QUESTION 4

What are the next two terms in this sequence?

2a+b, $\frac{7}{2}$a+5b, 5a+9b, $\square$, $\square$

**$\frac{13}{2}$a+13b, 8a+17b**

## ROUND 1, QUESTION 5

The sum of the ages of 5 teachers is 190.

The mean age of the teachers is 10 years greater than the median age. The modal age is 5 years less than the median age. One of the teachers is 56 years old.

How old are the other four teachers?

**23, 23, 28, ~~56~~, 60**

## ROUND 1, QUESTION 6

I am thinking of a number:

- It is a 2-digit number.
- It is between 60 and 80.
- The tens digit is 2 more than the ones digit.
- It is not 64.

What number am I thinking of?

***75***

Round 2

# Memory Round

# ROUND 2

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

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

# ROUND 2

The poster will be shown on the screen.  The artists 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

Artists can draw at any time during the whole period.

# ROUND 2

## Hint for the observers

Don’t try to memorise the entire poster at once. The poster is in a number of sections, so focus on one or two parts at a time.

## Note to the artists

Place your piece of paper in **landscape** orientation (i.e. the same way up as the screen you are currently looking at).

Final Note: ignore any colours…. Your poster should be in black and white only

# ROUND 2

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.)

# ROUND 2

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 artists ... and to get into position!

## ROUND 2

Poster about to be displayed for the first time.

# Factors

A **Factor** is a number that divides into another number perfectly.

For example: 4 is a factor of 12 because 12 ÷ 4 equals a whole number (3)

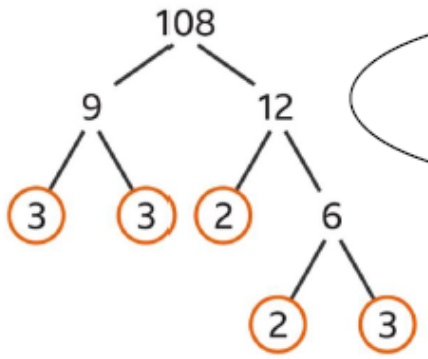
We can list factors by finding **factor pairs**:

24 = 1x24
24 = 2x12
24 = 3x8
24 = 4x6
So the factors of 24 = 1,2,3,4,6,8,12,24

Every number can be written as a product of prime numbers.

We call this **Prime Factor Decomposition**

e.g.

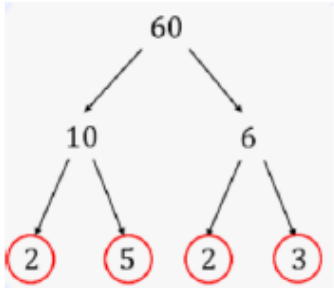


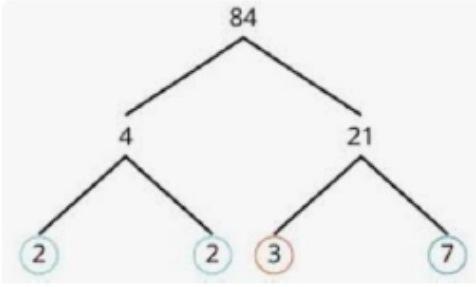

So we can write:

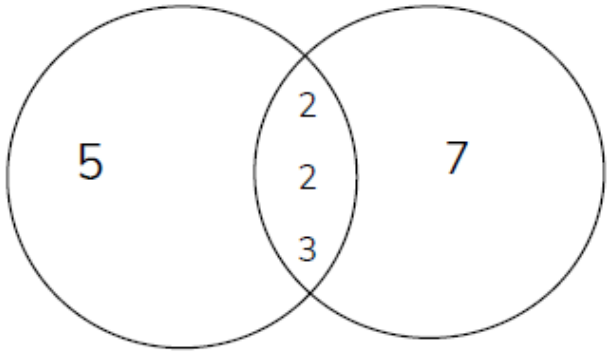
108=2x2x3x3x3

We can use Prime Factor Decomposition to find **Highest Common Factors**.

**Venn Diagrams** help with this...




By multiplying the factors in the MIDDLE together, you obtain the **HCF of 60 and 84**:

**2 x 2 x 3 = 12**

Round 2

# Memory Round

# ROUND 2

Second viewing of poster coming up!

# Factors

A **Factor** is a number that divides into another number perfectly.

For example: 4 is a factor of 12 because 12 ÷ 4 equals a whole number (3)

We can list factors by finding **factor pairs**:

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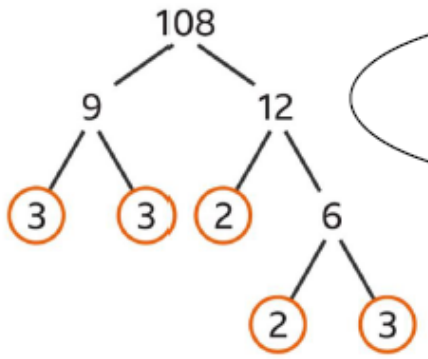


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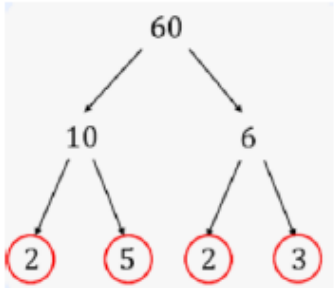


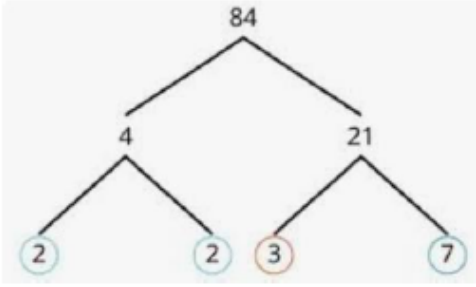


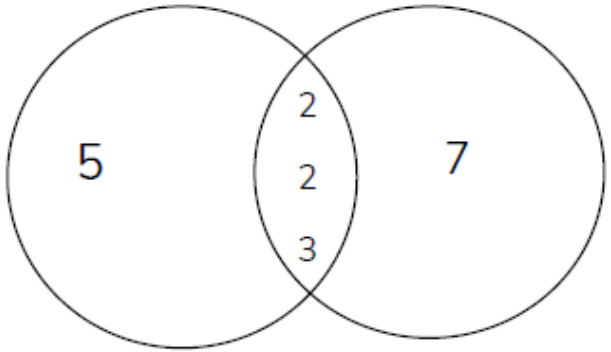


By multiplying the factors in the MIDDLE together, you obtain the **HCF of 60 and 84**:

**2 x 2 x 3 = 12**

Round 2

# Memory Round

# ROUND 2

Third viewing of poster coming up!

# Factors

A **Factor** is a number that divides into another number perfectly.

For example: 4 is a factor of 12 because 12 ÷ 4 equals a whole number (3)

We can list factors by finding **factor pairs**:

24 = 1x24
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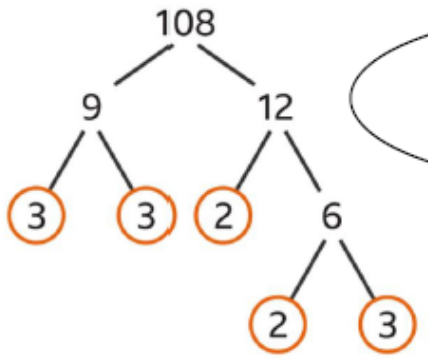


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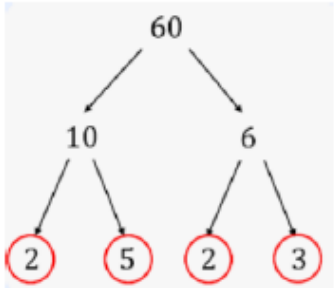


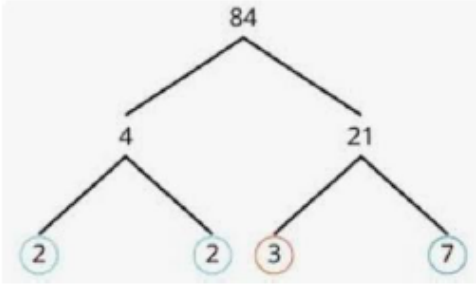


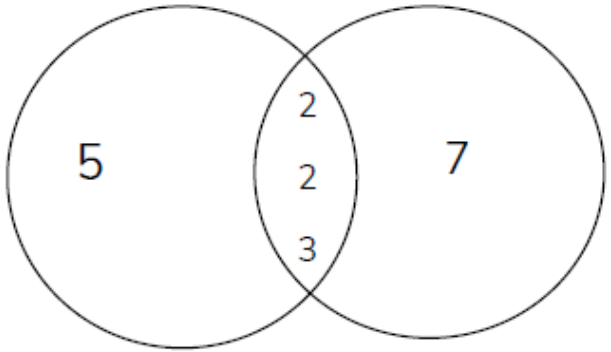


By multiplying the factors in the MIDDLE together, you obtain the **HCF of 60 and 84**:

**2 x 2 x 3 = 12**

Round 2

# Memory Round

## ROUND 2

# Fourth and final viewing of poster coming up!

# Factors

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For example: 4 is a factor of 12 because 12 ÷ 4 equals a whole number (3)

We can list factors by finding **factor pairs**:

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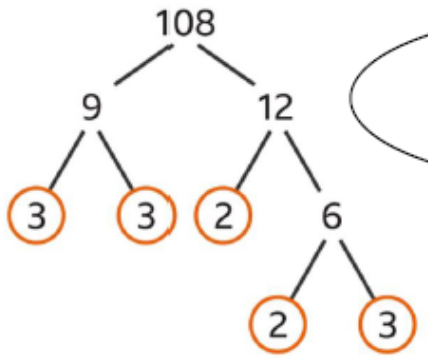


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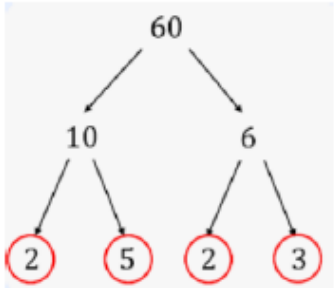
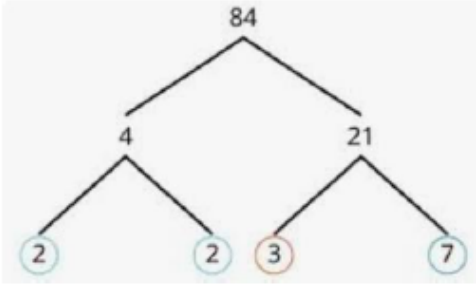
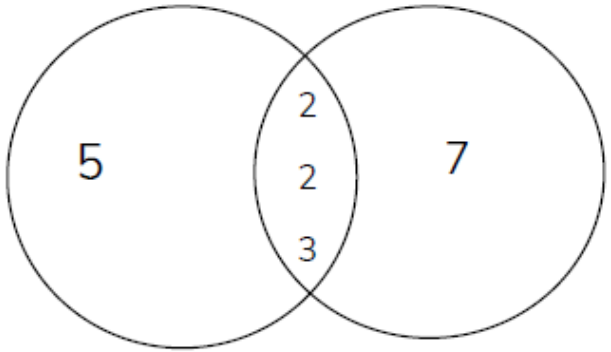



By multiplying the factors in the MIDDLE together, you obtain the **HCF of 60 and 84**:

**2 x 2 x 3 = 12**

Round 2

# Memory Round

## ROUND 2

# Time’s up!

Everyone should now come back into the main room.

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

**madeline.hyles@hfleducation.org**

# End of Round 2

A reminder of the e-mail address to send the finished posters to:

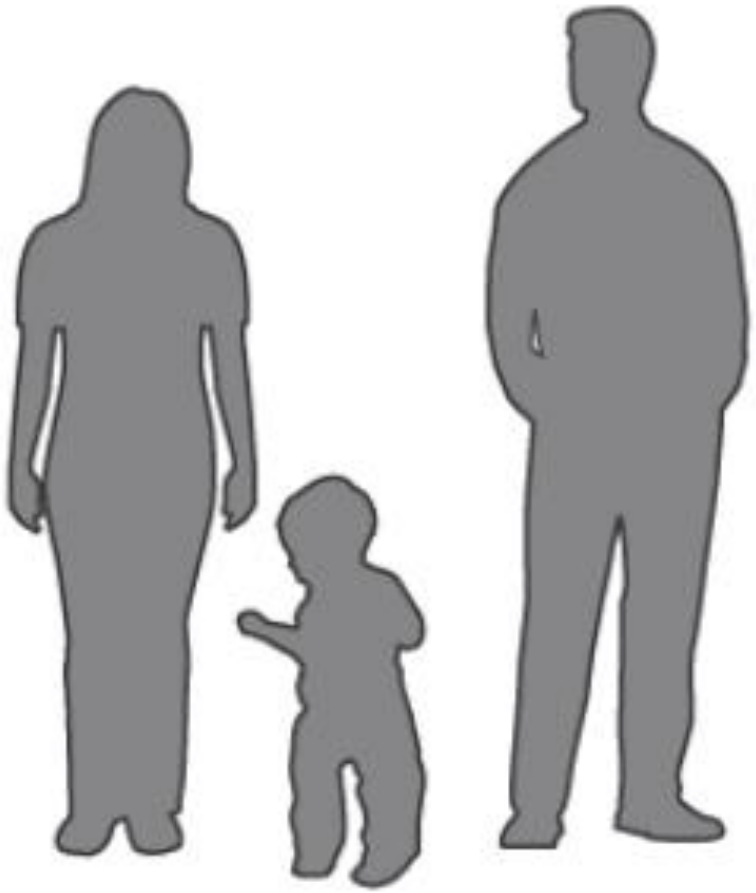
**madeline.hyles@hfleducation.org**

Round 3

# Estimation Round

**90 seconds for each question**

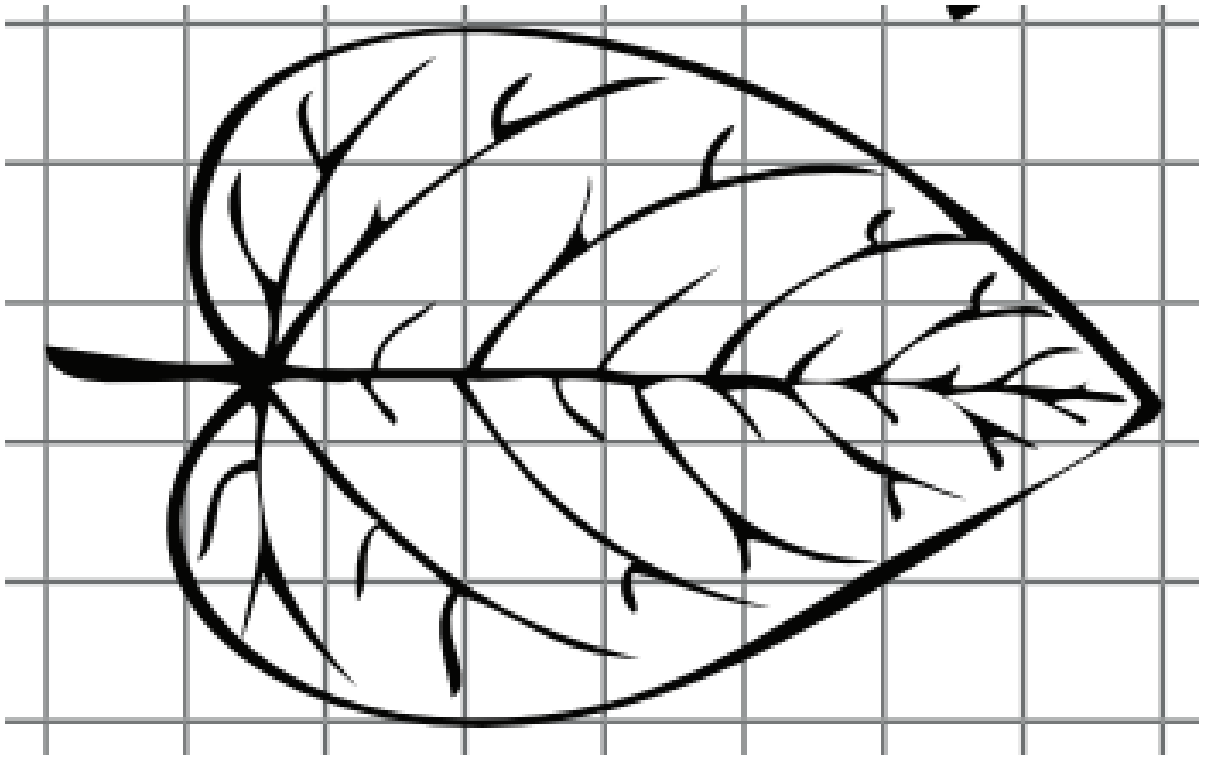
# ROUND 3, QUESTION 1



The child in this picture is 82cm tall.

Estimate the height of his mother and father (in cm).

# ROUND 3, QUESTION 2



1 cm²

Estimate the area of this leaf in cm²

# ROUND 3, QUESTION 3

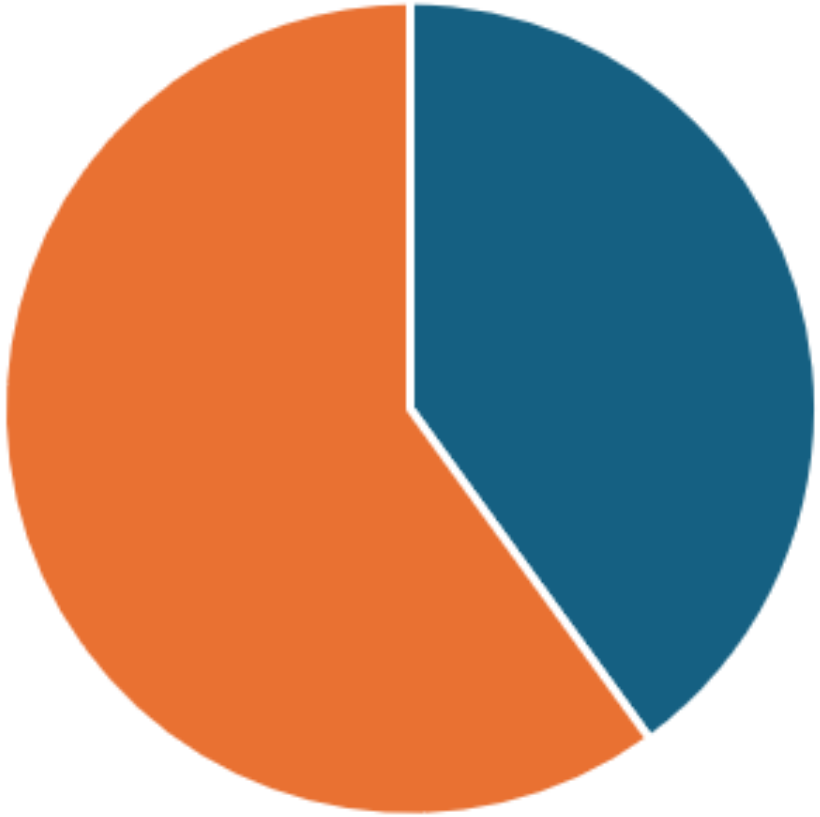
Place these calculations in increasing order of their value.

| A | B | C | D |
|---|---|---|---|
| $(22.2 - 2) \times 22$ | $\frac{2222}{22.2}$ | $22.2^2$ | $22\sqrt{222}$ |

On the *online answer* sheet, enter one letter per cell, for example:

| | | | |
|---|---|---|---|
| D | C | B | A |

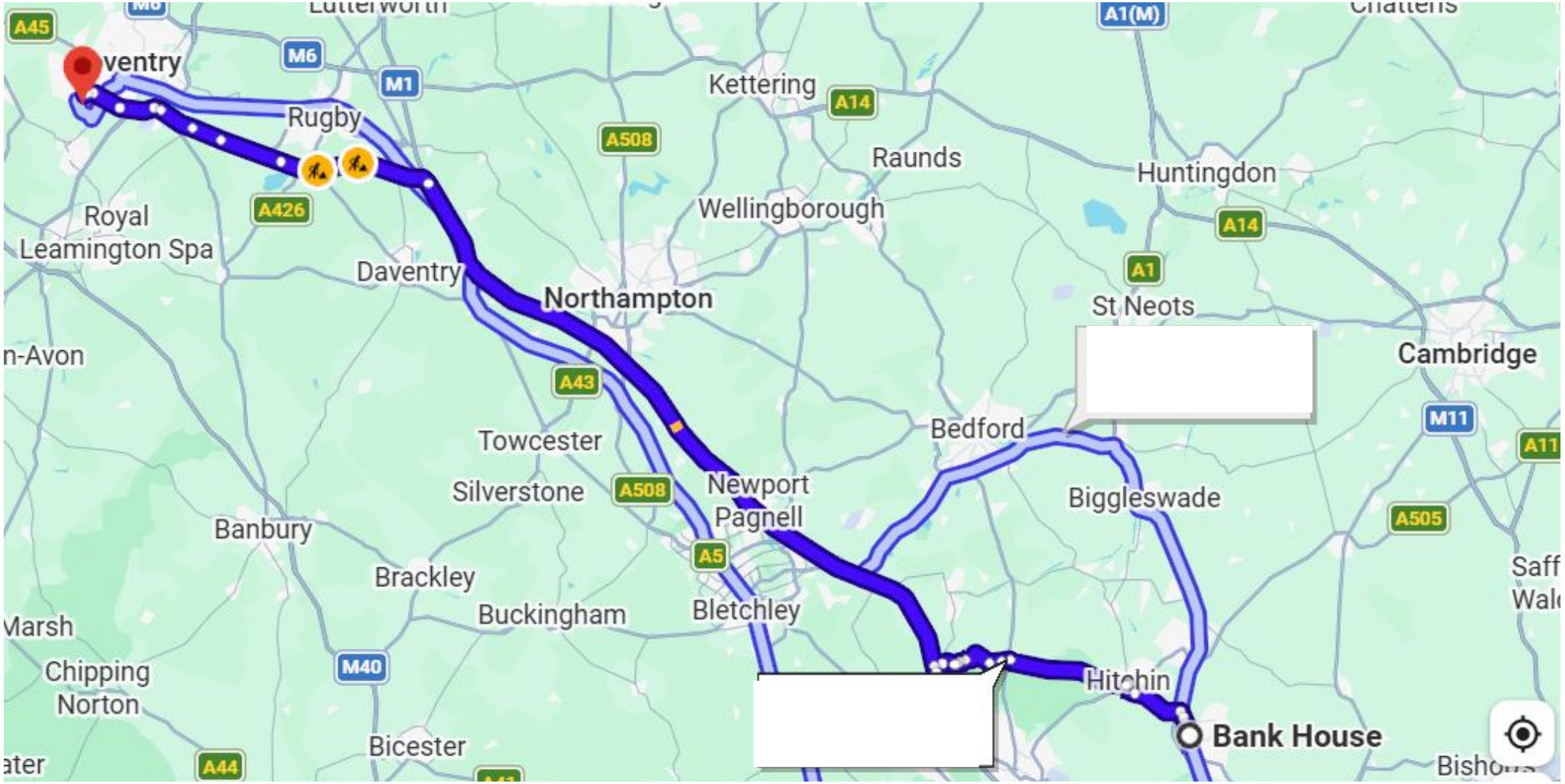
# ROUND 3, QUESTION 4



Estimate the percentage of this pie chart shaded orange

# ROUND 3, QUESTION 5


Estimate the length of the dark blue route shown on the map, in km.


A45
M6
M1
A1(M)
Rugby
Kettering
A14
A508
Raunds
Huntingdon
A426
Wellingborough
A14
Royal
Leamington Spa
A1
Daventry
Northampton
St Neots
Cambridge
A43
Towcester
Bedford
M11
A11
Silverstone
A508
Newport
Pagnell
Biggleswade
A505
Banbury
A5
Brackley
Buckingham
Bletchley
Hitchin
M40
Chipping
Norton
Bank House
Bicester
A44
20 km

# ROUND 3, QUESTION 6

Earlier in the challenge, you saw this sequence:

$2a+b, \frac{7}{2}a+5b, 5a+9b, \square, \square$

Estimate the number of minutes since it first appeared on the screen.

# End of Round 3

Please finalise your answers, and pass them to your teachers for entry onto the *online answer* sheet.

# ANSWERS TO ROUND 3

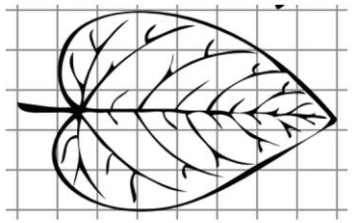
## ROUND 3, QUESTION 1

The child in this picture is 82cm tall.

Estimate the height of his mother and father (in cm).

**M = 162-166cm, F = 180-184cm**

## ROUND 3, QUESTION 2



1 cm²

Estimate the area of this leaf in cm²

**24-28cm²**

## ROUND 3, QUESTION 3

Place these calculations in increasing order of their value.

| A | B | C | D |
|---|---|---|---|
| $(22.2 - 2) \times 22$ | $\frac{2222}{22.2}$ | $22.2^2$ | $22\sqrt{222}$ |

On the *Google* sheet, enter one letter per cell, for example:

| D | C | B | A |
|---|---|---|---|

**B,D,A,C**

## ROUND 3, QUESTION 4

Estimate the percentage of this pie chart shaded orange

**58-62%**

## ROUND 3, QUESTION 5


Estimate the length of the dark blue route shown on the map, in km.

**115-125km**

## ROUND 3, QUESTION 6

Earlier in the challenge, you saw this sequence:

$2a+b, \frac{7}{2}a+5b, 5a+9b, \square, \square$

Estimate the number of minutes since it first appeared on the screen.

**± 2 mins**

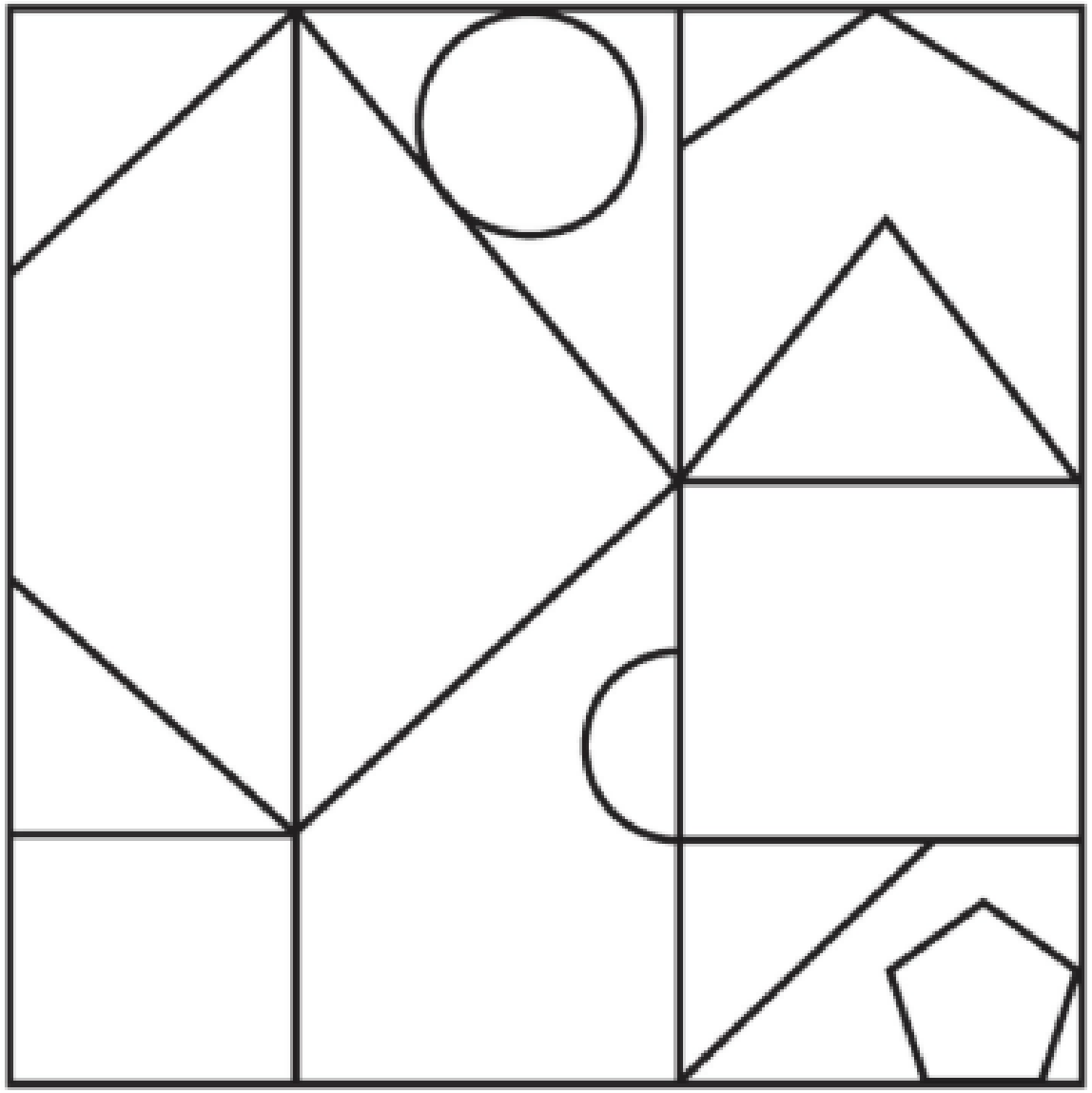
Round 4

# General Mathematics Questions

**90 seconds for Questions 1 to 4**

**2 minutes for Questions 5 and 6**

# ROUND 4, QUESTION 1



How many triangles are in this picture?

# ROUND 4, QUESTION 2

Here is the menu for a three-course meal in a local restaurant.

How many combinations of three courses could a customer choose?

**Starters**

Soup of the Day

Garlic Mushrooms

**Main Courses**

Roast Chicken

Steak and Chips

Veggie Lasagne

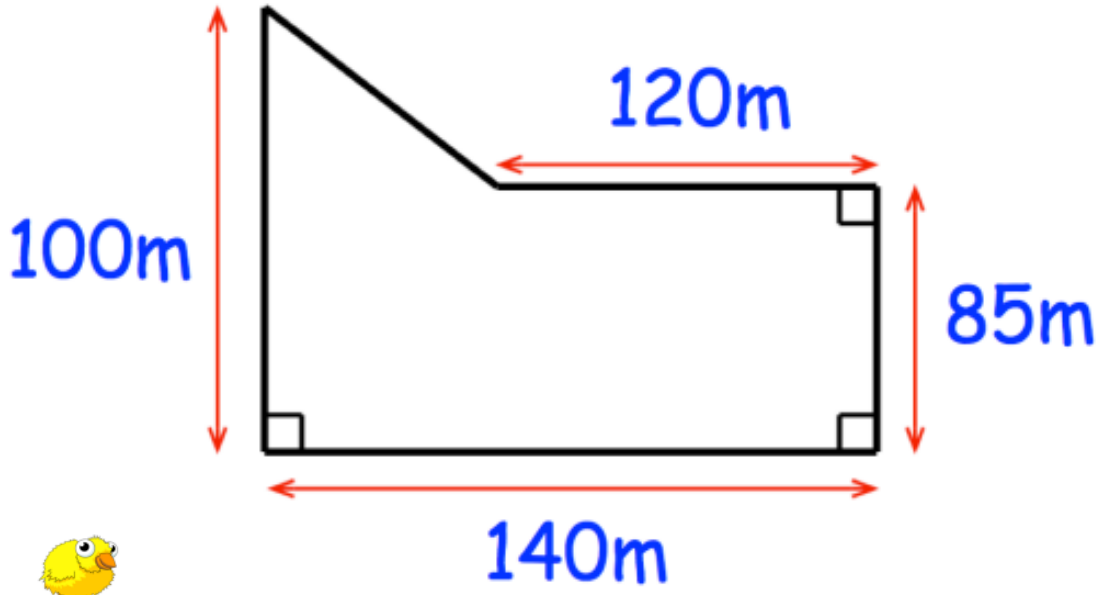
**Dessert**

Trifle

Sticky Toffee Pudding

# ROUND 4, QUESTION 3

Farmer Sprout keeps chickens in a field shaped like this:




Each chicken requires $3m^2$ of field each.

Work out the maximum number of chickens he can keep.

# ROUND 4, QUESTION 4

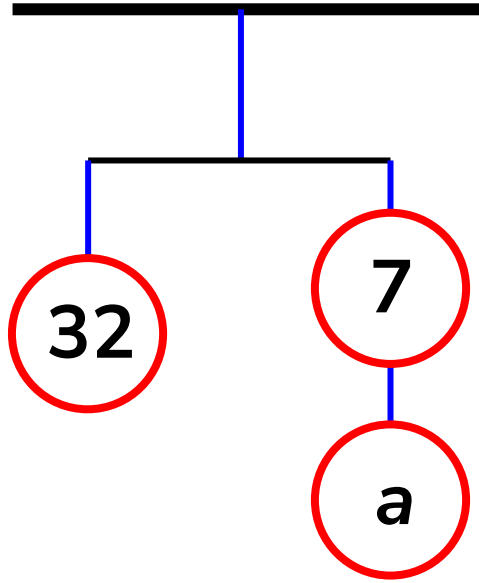
Aidan and Rowan share some money.

Aidan has six times as much money as Rowan.

Rowan's share is £205 less than Aidan's share.

How much money did they share in total?

# ROUND 4, QUESTION 5



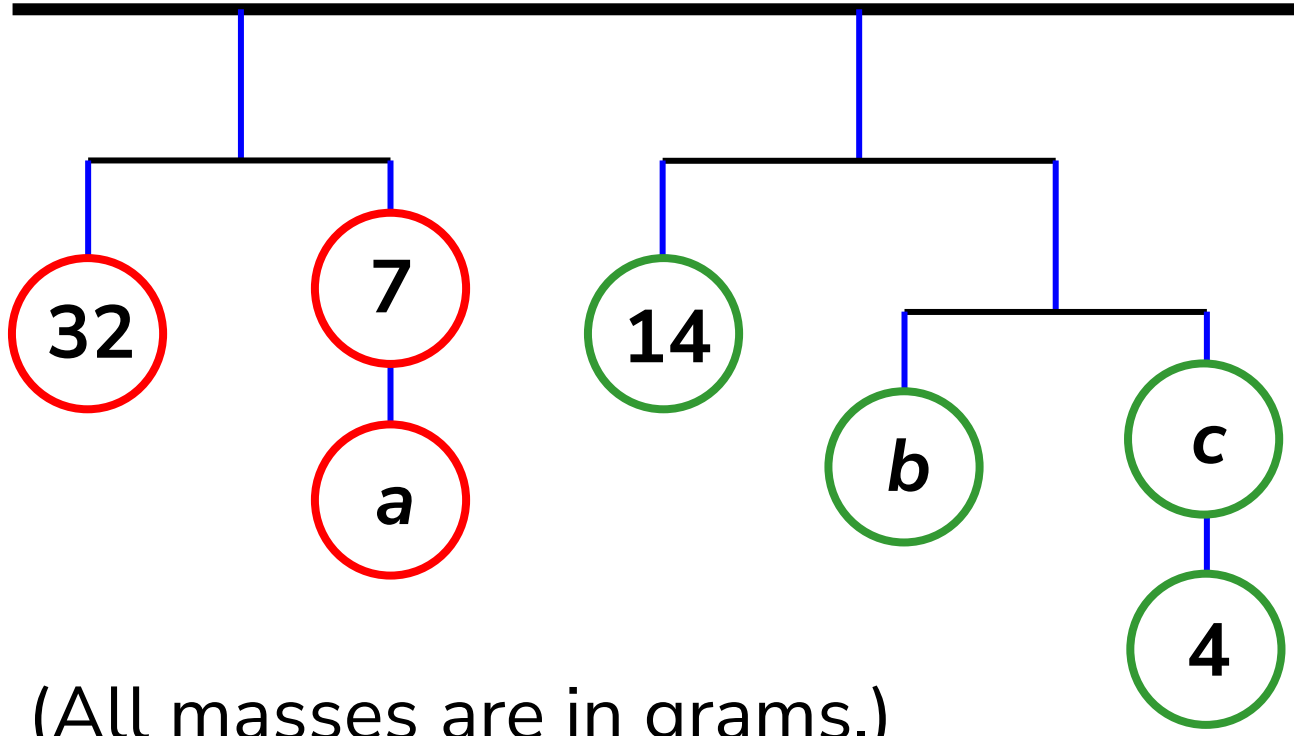

(All masses are in grams.)

This is a mobile, hanging from a horizontal ceiling.

The vertical lines are strings. The horizontal line is a light piece of wood.

There are objects hanging from the mobile, so that it is perfectly balanced. The mass of each object is given.

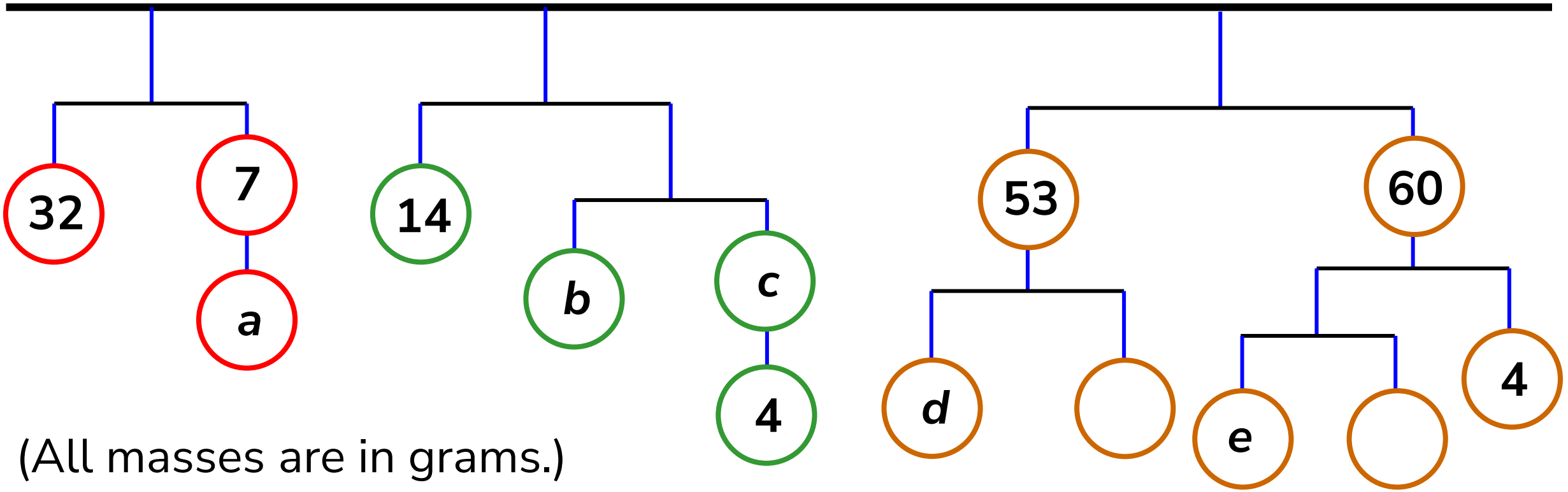
# ROUND 4, QUESTION 5




(All masses are in grams.)

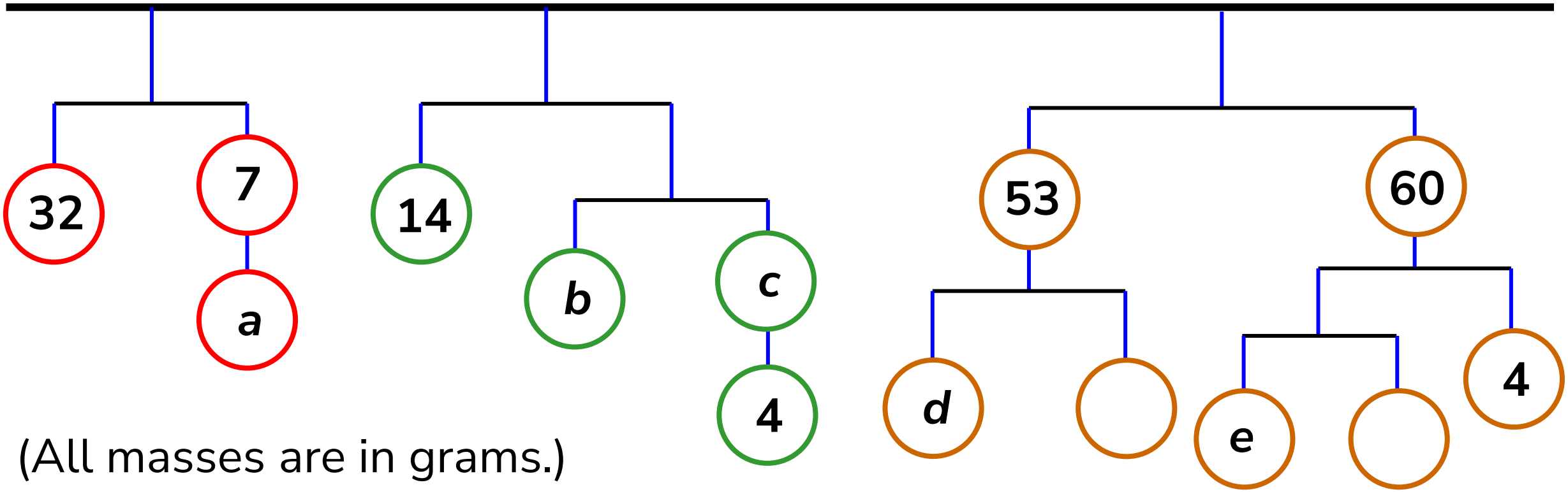
Here is a second mobile, and there is a third one on the next screen.

# ROUND 4, QUESTION 5




(All masses are in grams.)

# ROUND 4, QUESTION 5




(All masses are in grams.)

Find the masses of the objects marked *a*, *b*, *c*, *d and* *e*.

# ROUND 4, QUESTION 6

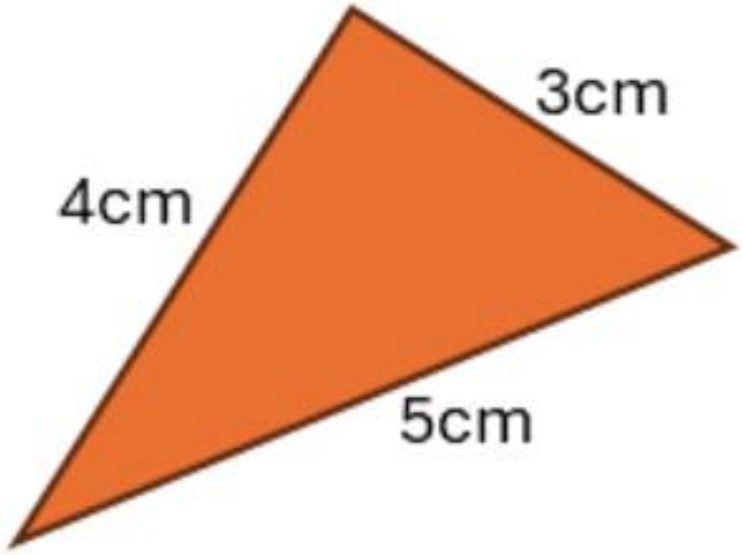
Heron’s Formula is a way of calculating the area of a non-right-angled triangle using the three sides.

Step 1:

Calculate the semi-perimeter $s$ using the formula:

$$s = \frac{a+b+c}{2}$$

Where $s$ is half the perimeter of the triangle.




Step 2:

Use Heron's Formula to calculate the area $A$ of the triangle:

$$A = \sqrt{s(s-a)(s-b)(s-c)}$$

Where $A$ is the area of the triangle.

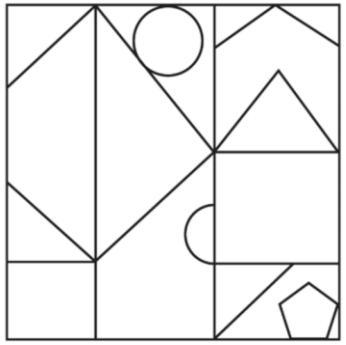
Use Heron’s Formula to find the area of this orange triangle.

# End of Round 4

Please finalise your answers, and pass them to your teachers for entry onto the *online answer* sheet.

# ANSWERS TO ROUND 4

## ROUND 4, QUESTION 1



How many triangles are in this picture?

**8**

## ROUND 4, QUESTION 2

Here is the menu for a three-course meal in a local restaurant.

How many combinations of three courses could a customer choose?

**Starters**
Soup of the Day
Garlic Mushrooms

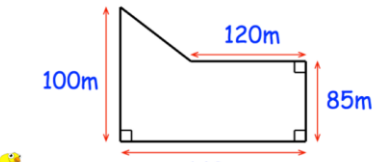
**Main Courses**
Roast Chicken
Steak and Chips
Veggie Lasagne

**Dessert**
Trifle
Sticky Toffee Pudding

**12**

## ROUND 4, QUESTION 3

Farmer Sprout keeps chickens in a field shaped like this:




Each chicken requires $3m^2$ of field each.

Work out the maximum number of chickens he can keep.

**4016 chickens**

## ROUND 4, QUESTION 4

Aidan and Rowan share some money.

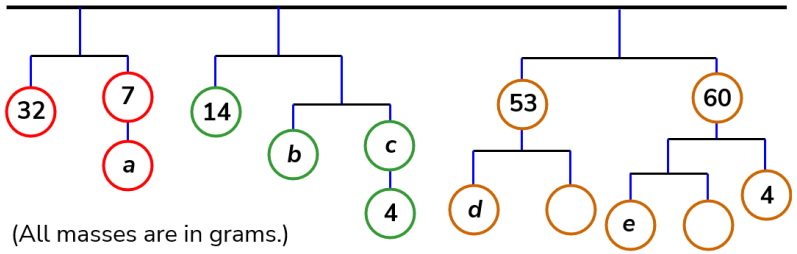
Aidan has six times as much money as Rowan.

Rowan's share is £205 less than Aidan's share.

How much money did they share in total?

**£287**

## ROUND 4, QUESTION 5




(All masses are in grams.)

Find the masses of the objects marked *a*, *b*, *c*, *d and e*.

**a=25, b=7, c=3, d=7.5, e=2**

## ROUND 4, QUESTION 6

Heron's Formula is a way of calculating the area of a non-right-angled triangle using the three sides.

Step 1:

Calculate the semi-perimeter $s$ using the formula:

$$s = \frac{a+b+c}{2}$$

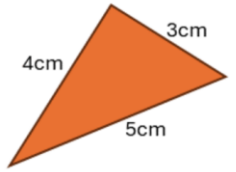
Where $s$ is half the perimeter of the triangle.

Step 2:

Use Heron's Formula to calculate the area $A$ of the triangle:

$$A = \sqrt{s(s-a)(s-b)(s-c)}$$

Where $A$ is the area of the triangle.




Use Heron's Formula to find the area of this orange triangle.

**6**

# Factors

A **Factor** is a number that divides into another number perfectly.

For example: 4 is a factor of 12 because 12 ÷ 4 equals a whole number (3)

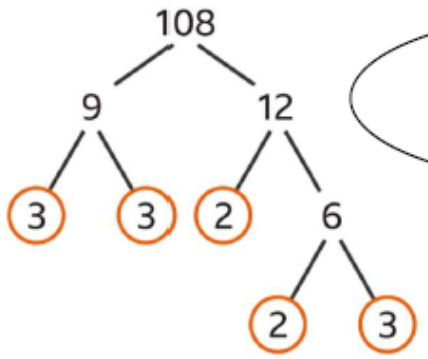
We can list factors by finding **factor pairs**:

24 = 1x24
24 = 2x12
24 = 3x8
24 = 4x6
So the factors of 24 = 1,2,3,4,6,8,12,24

Every number can be written as a product of prime numbers.

We call this **Prime Factor Decomposition**

e.g.

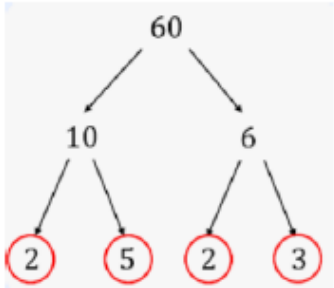


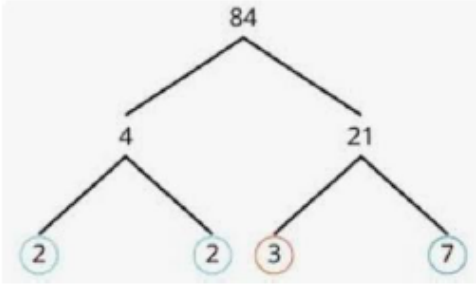

So we can write:

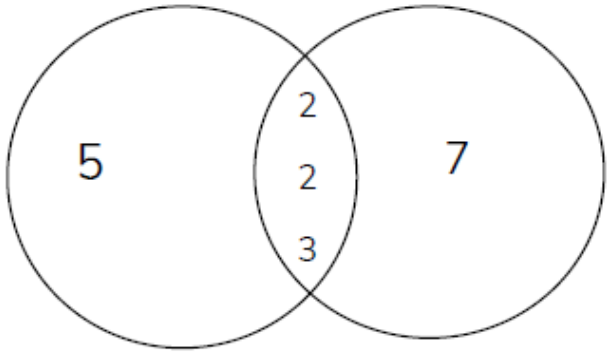
108=2x2x3x3x3

We can use Prime Factor Decomposition to find **Highest Common Factors**.

**Venn Diagrams** help with this...




By multiplying the factors in the MIDDLE together, you obtain the **HCF of 60 and 84**:

**2 x 2 x 3 = 12**

# YEAR 7 MATHS CHALLENGE 2026, HEATS

**Well done to all!**

The results are ...

# YEAR 7 MATHS CHALLENGE 2026, HEATS

Thank you for taking part.

# YEAR 7 MATHEMATICS CHALLENGE

Heats 2026, *Online*

Melanie Chrisp, HfL Secondary Mathematics Adviser

Madeline Hyles, Secondary Team

HFL Education