# 2024 HFL EDUCATION
# YEAR 6 MATHEMATICS CHALLENGE.

# EVENT GUIDANCE AND PRACTICE QUESTIONS

# Event Guidance

## Format

- This competition will begin with four 1-hour heats for teams to join online from their school.
- The 20 highest scoring teams from across the heats will be invited to join us online again for the Grand Final.
- Schools can enter multiple teams on the same date or across different heat dates.
- Each team should be made up of four Year 6 pupils who will work together to solve questions and problems across three live rounds.

## Live rounds

- There are three rounds in each live heat.
- Two rounds consist of questions or problems from across the mathematics curriculum to solve.
- One round consists of estimation questions and problems including visual estimation.
- There will be time limits for each question, usually of 2 or 3 minutes, which will be explained by the presenter in each round.
- A 'final few seconds' prompt will be provided by the presenter so teams can agree their answer and get ready for the next question.

## Pre-heat challenges

- **Teams will be sent some problems to solve in school, in advance of their heat.**
- There will be a time limit of 30 minutes to solve the problems.
- Answers to the problems will be submitted using the Google Form made available during the event. Scanned or photographed copies of the children's work will need to be emailed to **year6mathschallenge@hfleducation.org** to enable us to give part marks for workings out.

# Submitting answers

- 'Team answer sheets' will be available to download prior to the live event. These can be printed and provided to the team to write on.
- Final answers need to be entered into the Google Form by the supervising adult.
- Submission of answers will be explained during the live event.

# Scores

- Following the completion of the live heats, team marks will be emailed to the school contact.
- A certificate for each member of the team will also be sent to the school contact.

## Invitation to the final

After all four heats have been completed, the 20 highest scoring teams will be notified by email and invited to take part in the final on **Wednesday 27th November 2024 from 1:30 - 3:10pm.**

# The event platform for the heats

- The heats and final will take place on the HFL Education webinar platform.
- For the best functionality, we recommend accessing the event using Google Chrome, Safari or Firefox as the web browser.
- Instructions for joining the live event will be provided upon booking.
- For any issues with the registration process, please contact us at **primarymaths@hfleducation.org**.

# Getting ready

- The team will need to have clear access to a screen and sound. A class whiteboard or screen is advisable for size but not essential.
- Pupils cannot be seen or heard by other schools or the presenters.
- The supervising adult can use the 'chat' facility to communicate with the presenters.
- We recommend that pupils have paper, pencils, pens, and erasers.
- Supervising adults are asked to ensure that pupils do not have calculators or rulers.

# If you have entered multiple teams

- If you have entered more than 1 team, schools can choose whether the teams will take part from the same room (separated) or in different rooms.
- Decide who Team A and Team B etc. are and include this in the team name on the Google Form.
- If teams are in the same room, please ensure the screen they can all see is large enough.

# Correspondence

All correspondence, including queries, should be sent to **primarymaths@hfleducation.org**

# Challenge, teamwork, making sense of problems and sharing ideas

To support your team, we have compiled some practice questions and top tips for each round.

## Challenge

The competition is designed to be fun and will challenge teams in many ways. Not least in the mathematical focuses, but also in working 'well' as a team and agreeing answers within the time limit set.

## Teamwork

Collaborative working in mathematics (and in life) is a crucial skill. The competition challenges how well teams can work together. Alongside practising strategies to solve mathematical questions and problems, it is also helpful to consider how to be a great team.

### Tips for developing great teamwork:

Working together is crucial. Think about how you can best do this.

- Decide upon who the 'scribe' (answer recorder) is. This isn't the person who makes the final decision, but they will ensure that your team commits to an answer before time runs out.

- Use paper to record your jottings and ideas. These will be helpful when showing other team members your thoughts.

- You may decide to quickly divide up parts of a question to work out a smaller part each before coming back together to agree an overall answer.

- Think through how you can quickly reach an agreement, listen to each other, and consider each team member's response. Agreeing how you will calmly negotiate will really help in the midst of the competition.

## Making sense of problems and sharing ideas

When thinking about and articulating their thoughts around a problem or question, children might find the following sentence frames useful:

- I can see …
- I have noticed …
- I know that …
- If … then …
- I see what you mean. What I've noticed is that … What do you think?

# Practice Questions

The following practice questions and answers will be available as a PowerPoint upon booking for use in school.

## Round 1 and 4 – General mathematics

These two rounds each consist of questions that need to be solved within a time limit. Teams must work quickly and efficiently. Each question will have a different mathematical focus and will require different types of problem-solving skills.

Each question is 'marked' out of 10. Marks can be awarded for partial answers.

Some questions ask pupils to complete a calculation. In these, pupils can solve separately and then compare their answers to agree the team's response.

## Questions with 'parts'

Some questions contain 'parts' to solve. Team members could solve one 'part' each and then use these to agree an overall answer. A team member may have a strength in one aspect but teams will need to decide quickly if they are going to distribute roles as the clock will be ticking.

Some example 'parts' style questions:

**Solutions can be found on page 10.**

---

**MULTIPLE CHOICE**

When divided into 6371, which set of numbers each have a remainder of 1?

A) 2,3,4
B) 3,4,6
C) 2,5,7
D) 5,7,9

---

Put these values in order, starting from the smallest answer.

(answer in the form A, B, C, D)

A) $903 \div 7$
B) 37% of 400
C) $\frac{3}{7}$ of 315
D) $3.7 \times 36$

---

Miss McKay likes to line her class up in different ways.

When all the pupils are there, she can line them up in twos, or in threes or in fives, with nobody left over.

What number of children could she have in her class for that to be true?

A) 20
B) 25
C) 30
D) 24

---

What is the value of 🔷 (blue pentagon) ?

| 🔷 | 🔷 | 🟣 | $4\frac{7}{15}$ |
| 🟣 | 🔷 | 🔷 | $4\frac{2}{15}$ |
| 🟣 | 🔷 | 🟣 | $5\frac{12}{15}$ |
| $5\frac{12}{15}$ | $3\frac{2}{5}$ | $5\frac{1}{3}$ | |

# Problem-style questions

Some questions require pupils to problem solve in context. Teams will have to work quickly to establish what the problem is asking them to do and identify the relevant information that they need to work on.

Teams can work separately or in pairs to work on the problem and then confer to agree the solution.

Being able to make quick sketches and representations to aid thinking will support this, as will pausing to consider what is 'known' and what is 'unknown' in a problem.

Some examples of 'problem-style' questions:

**Solutions can be found on page 11.**

Last year, Stevie was 7 times older than her brother Jason.
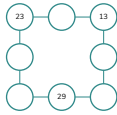This year, Stevie is 5 times older than Jason.
In how many years will Stevie be 3 times Jason's age?

5 © HFL EDUCATION

HFL

---

When this prime number square is completed, the eight circles contain different prime numbers. Each of the four sides has a total of 43. Complete the square.
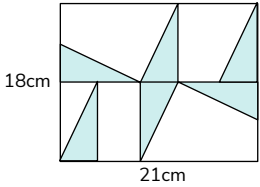
23 — — 13

29

7 © HFL EDUCATION

HFL

---

Six identical right-angles triangles fit inside a rectangle. The rectangle measures 18cm by 21cm.

What is the shaded area?

18cm

*(not drawn to scale)*

21cm

2 © HFL EDUCATION

HFL

---

In this addition calculation, each letter represents a different non- zero digit. What is the value of E?

$$B\ E\ E\ +$$
$$B\ E\ E$$
$$\overline{H\ E\ L\ P}$$

8 © HFL EDUCATION

HFL

# Round 2 – The estimation round

This round consists of a series of questions and problems that focus on pupils' estimation skills.

Each answer in the estimation round is worth up to 10 points. Teams do not need to have the 'exact' answer. Instead, they use their estimation skills to agree answers that are approximately accurate.

Marks are awarded in 'zones of closeness'. So, for example, if the exact answer was 100, pupils would be awarded the full 10 marks for an answer between 95 – 105. Points then decrease incrementally as the distance from the 'exact' answer increases.

As this challenges estimation, we suggest pupils practise by thinking about what good estimates might be. Teams might also think about how they can work together to look at the visual stimulus, think separately or in pairs and then reach an agreed team response.

**The most important tip** is to look carefully at the image and the clues and prompts already provided.

The following questions provide opportunities for practice of estimation and of team-working:

**Solutions can be found on page 12.**



Estimate the total weight.
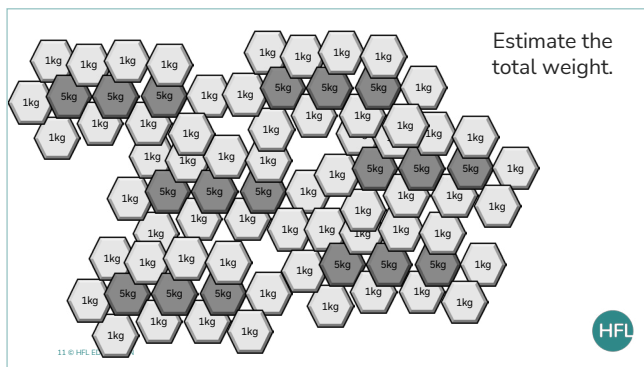
## Tips:

- Remember this is a visual estimation question and not an exact counting one.
- Would splitting the image into sections for each team member to scan and approximate help?
- Would taking an estimate from a quarter and then scaling up help?



Estimate the number the arrow is pointing to on the number line.

1.06

1.37
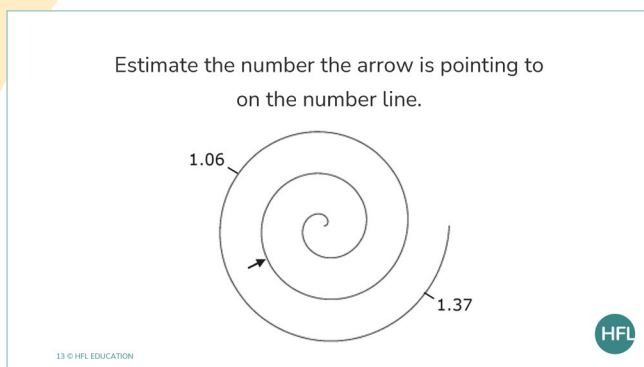
## Tips:

- Estimate the position of other 'benchmark' numbers and the space between them.
- Think about whether the line is increasing or decreasing in value as it swirls towards the arrow.

# Round 3 – Complex Conundrums!

Schools will be provided with three complex conundrums which the children will complete before the live heat. Team answers to this round will be submitted within the Google Form made available during the event. To enable us to give part marks for workings out, please also email photographs or scanned copies of the children's work to **year6mathschallenge@hfleducation.org**. Emails will need to be sent by the date provided in the heats to allow time for marking.

Points will be awarded for correct answers and part answers. There will be a maximum of 45 points available for this round. Conundrum A is worth a maximum of 10 points, conundrum B is worth a maximum of 15 points and conundrum C is worth a maximum of 20 points.

Rules:

- There is a time limit of 30 minutes for this round.
- Teams should be provided with all 3 conundrums at the same time.
- Teams can choose to solve the conundrums in any order.
- Teams can decide how long they spend tackling each conundrum but must agree their final answers within the 30 minute time limit.
- Teams will need to record their answers and then these will be submitted via the Google Form during the live event. Scanned or photographed copies of the children's work will need to be emailed to year6mathschallenge@hfleducation.org to enable us to give part marks for workings out.

Examples of Complex Conundrums:

Turquoise paint can be made by mixing:

- 0.05L of yellow paint
- 375ml of blue paint
- 1.2L of green paint

Rita and James want to make some of this turquoise paint.

They use three quarters of a 10L tin of blue paint.
In litres, how much turquoise paint do they make?

HFL

---

Ruby, Ali and Rueben have been
collecting £1 coins.

- Ruby has 20% more £1 coins than Rueben.
- Ali has $\frac{1}{3}$ fewer of the £1 coins Ruby has.

At the weekend, Ruby spends half of her coins,
and Rueben and Ali spend £453 in total.
They each now have the same amount of money.
How much did they have altogether before the weekend?

HFL

---

## Tips:

- Have a quick look at the three conundrums and decide in which order you will tackle them.
- Consider the complexity of each conundrum and think about how much time you will spend on each.
- Will you all work on the same conundrum or will you split up and then discuss your final answers?

# Solutions

---

**MULTIPLE CHOICE**

When divided into 6371, which set of numbers each have a remainder of 1?

A) 2,3,4
B) 3,4,6
C) 2,5,7
D) 5,7,9

6 © HFL EDUCATION

**Answer: C**

6371/2 = 3185r1

6371/5 = 1274r1

6371/7 = 910r1

---

Put these values in order, starting from the smallest answer.
(answer in the form A, B, C, D)

A) $903 \div 7$
B) 37% of 400
C) $\frac{3}{7}$ of 315
D) $3.7 \times 36$

9 © HFL EDUCATION

A) 129

B) 148

C) 135

D) 133.2

**A, D, C, B**

---

Miss McKay likes to line her class up in different ways.

When all the pupils are there, she can line them up in twos, or in threes or in fives, with nobody left over.

What number of children could she have in her class for that to be true?

A) 20
B) 25
C) 30
D) 24

4 © HFL EDUCATION

**30**

---

What is the value of ⬠ ?

| ◆ | ◆ | ● | $4\frac{7}{15}$ |
| ● | ◆ | ⬠ | $4\frac{2}{15}$ |
| ● | ◆ | ● | $5\frac{12}{15}$ |
| $5\frac{12}{15}$ | $3\frac{2}{5}$ | $5\frac{1}{3}$ | |

3 © HFL EDUCATION

Square = 1 2/15

Circle = 2 1/3

**Pentagon = 2/3**

---

# Solutions (continued)

Last year, Stevie was 7 times older than her brother Jason.

This year, Stevie is 5 times older than Jason.

In how many years will Stevie be 3 times Jason's age?

5 © HFL EDUCATION

**Answer: 3 years**

**Solution:** this year's age is a multiple of 7 and this years age is a multiple of 5- only solution below 100 is 14 and 15. 14 x 2 and 15 x 3 so in three years, Jason will be 6 and Stevie will be 18.

---

When this prime number square is completed, the eight circles contain different prime numbers. Each of the four sides has a total of 43. Complete the square.
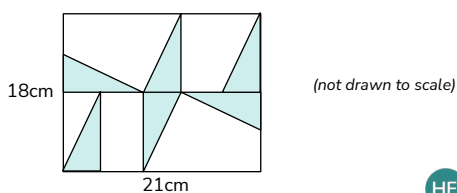
23 — 13

29
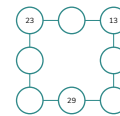
7 © HFL EDUCATION

**Solution:**

23　**7**　13

**17**　　　**19**

**3**　29　**11**

---

Six identical right-angles triangles fit inside a rectangle. The rectangle measures 18cm by 21cm.

What is the shaded area?

18cm

*(not drawn to scale)*

21cm

2 © HFL EDUCATION

**Each triangle has a height of 9cm (18 ÷ 2)**

**Each triangle has a base of 3cm (21 - 18)**

**Area of each triangle =**

**9 x 3 = 27　27/2 = 13.5**

**13.5 x 6 = 81**

---

In this addition calculation, each letter represents a different non- zero digit. What is the value of E?

$$B E E +$$
$$B E E$$
$$\overline{H E L P}$$

8 © HFL EDUCATION

**8 7 7 +**

**8 7 7**

**= 1 7 5 4**

# Solutions (continued)



Find the missing angles.

**Complex Conundrum A (practice)**

10 points

79° 167° 116° a°
d° e°
68° 84° c° b° 118°
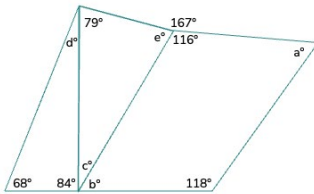
19 © HFL EDUCATION

a = 54°
b = 72°
c = 24°
d = 28°
e = 77°



Turquoise paint can be made by mixing:
- 0.05L of yellow paint
- 375ml of blue paint
- 1.2L of green paint

**Complex Conundrum B (practice)**

15 points

Rita and James want to make some of this turquoise paint.

They use three quarters of a 10L tin of blue paint.
In litres, how much turquoise paint do they make?

21 © HFL EDUCATION

**32,500ml or 32.5L**



Ruby, Ali and Rueben have been collecting £1 coins.

**Complex Conundrum C (practice)**

20 points

- Ruby has 20% more £1 coins than Rueben.
- Ali has $\frac{1}{3}$ fewer of the £1 coins Ruby has.

At the weekend, Ruby spends half of her coins,
and Rueben and Ali spend £453 in total.
They each now have the same amount of money.
How much did they have altogether before the weekend?

22 © HFL EDUCATION

**£2,265**