Hampshire Services
HIAS SCHOOL IMPROVEMENT

Using a framework to scaffold how to approach reasoning questions

The framework approach is to help you to tackle mathematical questions that may require more than one step to be taken. Understanding what the question is asking you to find out can be tricky. There may be some unfamiliar words within the question. Working through this framework will help you to have a strategy to approach questions like these.

It helps to read the question out loud. You won't be able to do this in a test, but whilst you are practising, this will help you. Try to put into your own words what the question is asking you to do. If you can work out how many steps are required, you can ensure you complete them all. Marks can easily be lost in a test situation because not all of the steps have been completed. Getting into the habit of checking off the correct number of steps will help you to become more efficient – but accurate. With practice, you will become faster.

Keep a focus on the context of the question, but decide on the calculations that are needed to solve it. Carry out the calculations in the most efficient way (you could try several ways to decide for yourself which is most efficient), then make sure you answer the original question fully.

On the next page, you will find a suggestion for a framework. This is followed by a worked example.

Then, there are several questions that lend themselves to this approach for you to practise. You will need several copies of the framework master.

A framework for solving a mathematical problem

The problem:
How many steps do you think will be needed to solve the problem?
List the steps. Write down the calculations needed each time:
Roughly, what will the answer be? (Why do you think that?)
Work through each step – solve the calculations:
Write the answer to the problem:

A framework for solving a mathematical problem

(worked example)

The problem:

This table shows the heights of three mountains.

Mountain	Height in metres
Mount Everest	8,848
Mount Kilimanjaro	5,895
Ben Nevis	1,344

How much higher is Mount Everest than the combined height of the other two mountains?

How many steps do you think will be needed to solve the problem?

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List the steps. Write down the calculations needed each time:

Step one: Find the combined height of Mount Kilimanjaro and Ben Nevis: 5895 + 1344 = ?

Step two: Find the difference between the total above and the height of Mount Everest: 8848 - ? =

Roughly, what will the answer be? (Why do you think that?)

I think the answer will be roughly 1500 because the answer to the first calculation would be around 7,300. If you take this away from just under 9,000 the answer would be roughly 1500.

Work through each step – solve the calculations:

Step 1:

```
  5895
+ 1344
  7239
   11
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Step 2:

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  8848
- 7239
  1609
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Write the answer to the problem:

1609 metres.

Problems to solve – use the Problem-solving framework

1.	At the start of June, there were 1,793 toy cars in the shop. During June, • 8,728 more toy cars were delivered • 9,473 toy cars were sold. How many toy cars were left in the shop at the end of June?
2.	Here is a rule for the time it takes to cook a chicken. **Cooking time = 20 minutes plus an extra 40 minutes for each kilogram** How many minutes will it take to cook a 3 kg chicken? What is the mass of a chicken that takes 100 minutes to cook?
3.	Ally and Jack buy some stickers.  **Pack of 12 stickers £10.49**  **12 stickers 99p each** Ally buys a pack of 12 stickers for £10.49 Jack buys 12 single stickers for 99p each. How much more does Jack pay than Ally?
4.	A recipe for 6 people requires 120g of flour and 240ml of milk. How much of each ingredient would you need if you were cooking for 8 people?
5.	If 5 burgers cost £7.50, what would the cost of 8 burgers be?

6. Sarah does a sponsored walk for charity. Each lap of the field takes 25 minutes. She has been sponsored £4.30 per lap. She walks for 2 ½ hours. How much money did she raise? How much longer would she have to walk to raise over £30?

7. Amina posts three large letters.

The postage costs the same for each letter.

She pays with a £20 note.

Her change is £14.96

What is the cost of posting **one** letter?

8. A group of friends earns £80 by washing cars.

They share the money **equally**.

They get £16 each.

How many friends are in the group?

9 The children at Farmfield School are collecting money for charity.

Their target is to collect £360

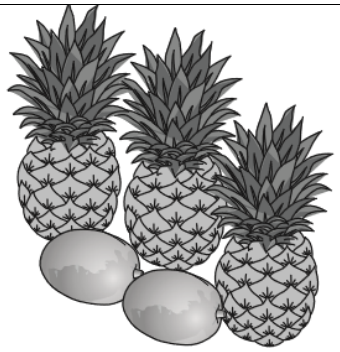
So far they have collected £57.73

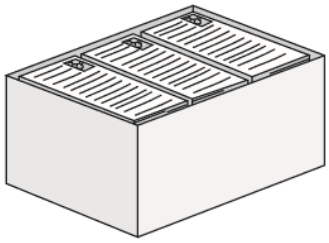
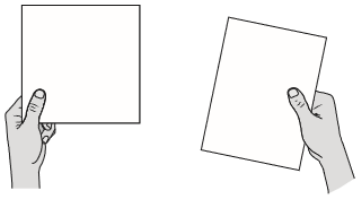
How much **more** money do they need to reach their target?

10. Here is the morning timetable for Chen's class this week.

Time	Mon	Tue	Wed	Thu	Fri
9:00 am–10:30 am	Maths	English	Maths	English	Maths
10:30 am–11:00 am	Break	Break	Break	Break	Break
11:00 am–12:00 pm	English	Maths	Science	Maths	English

What is the **total** number of hours for **English** on this timetable?

11.	3 pineapples cost the same as 2 mangoes. One mango costs £1.35  How much does **one** pineapple cost?
12.	  Adam buys **6** bags of white balloons. Chen buys **3** bags of red balloons. Adam says, ***'I have four times as many balloons as Chen.'*** Explain why Adam is correct.
13.	The cooking time for to roast a joint of meat is 35 minutes for every 500g. Dad wants to serve up Suday lunch at 13.20. The joint of meat weighs 2 ½ kg. What time should the meat go in the oven?
14.	Sam buys a 6-bottle pack of drinks for £2.90. He sells each can for 60p. How much profit does he make?
15.	A portion of chips costs £1.15. Leah buys 2 sausages and a potion of chips. She pays £2.51.

	How much does one sausage cost?
16.	Two adults and two children go to the cinema. Adult tickets cost £4.65 and childrens tickets are £2 cheaper. How much change would they get from a £20 note?
17.	Louise has £50. She buys 3 plants at £9. 75 eaxh and a trowel for £6.85. How much money will she have left?
18.	Find the total length of 3 pieces of wood with lengths 156cm, 3.7m and 1006mm.
19.	A jug holds 1.5 litres of water. Rob drinks 0.75 litres, Sam drinks 330ml and Tim drinks ¼ litre. How much water is left in the jug?
20.	 There are 2,400 leaflets in a box. William and Ally take 450 leaflets each. Adam and Chen share the rest of the leaflets equally. How many leaflets does Adam get?
21.	 A square tile measures 20 cm by 20 cm. A rectangular tile is 3 cm **longer** and 2 cm **narrower** than the square tile. What is the **difference in area** between the two tiles?
22.	A box containing 12 pencils weighs 250g. The empty box weighs 25g. What does each pencil weigh?
23.	Lauren recorded the daily temperatures (in degrees C) for one week of the summer holidays. Monday – 22, Tuesday 20, Wednesday 18, Thursday 17, Friday 19, Saturday 21, Sunday 23. What was the average temperature that week?
24.	At a concert, a burger and and two drinks costs £5.80. If the burger cost £3.60, wht is the price of one drink?

25.	Tickets for the cinema cost £5.40. Jenny buys tickets to go to the cinema with 5 friends. How much did this cost altogether?
26.	Mr Smith had a five metre length of wood. He cut off two pieces measuring 1.35m long and 238cm long. How much wood did he have left?