

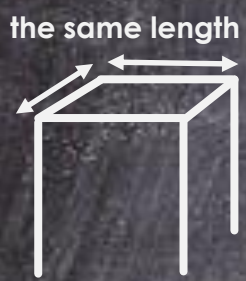
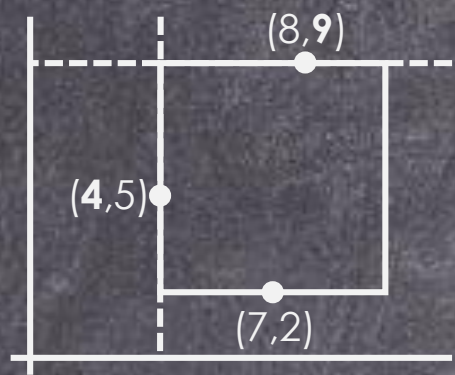
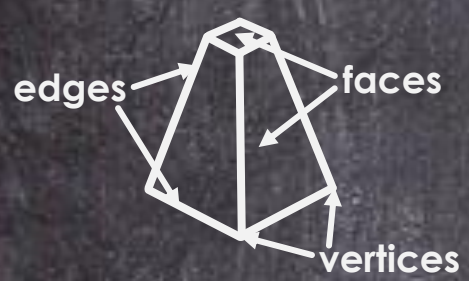
More or less than 8?

$\square \div 2 < 4$



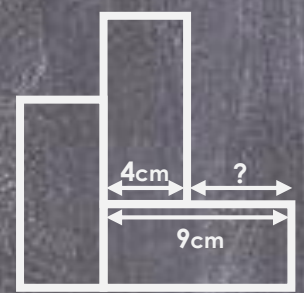
# I SEE PROBLEM SOLVING - UKS2

## MATHS TASKS FOR TEACHING PROBLEM-SOLVING



$\oplus \frac{5}{4}$

$$\begin{array}{r} 31 \\ 4 \overline{) 59} \\ \underline{27} \\ 5 \end{array}$$



90 kg	
Ben	Sam
Ben	Jack



GARETH METCALFE

Instant digital download  
in PDF format

# I SEE PROBLEM-SOLVING – UKS2

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# I SEE PROBLEM-SOLVING – UKS2

## Maths tasks for teaching problem-solving

## Introduction

### I See Problem-Solving – UKS2

helps all children to learn how to solve multi-step maths questions.

To use, print off the 'Question' page for the chosen task, giving each child a copy of the main question.

On the next page you will find the 'Prompts' for each task – print these off and make them available in the classroom. If children need more help they can read the **support** prompt. For more challenge, the **explain** and **extend** features are used.

The **worked examples** are available for free on [this page](#) as a PowerPoint or as a PDF file, modelling the solution to each of the main questions step-by-step.

The resource is comprised of 58 tasks, linked to all different areas of the upper KS2 mathematics curriculum.

I hope that **I See Problem-Solving – UKS2** helps all children to develop their maths problem-solving skills!

Gareth Metcalfe

#### Task 14 Question: Café calculations

A cup of tea and a biscuit costs £1.30.  
A cup of tea costs 60p more than a biscuit.



How much does a biscuit cost?

A cup of tea and a biscuit costs £1.30.  
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How much does a biscuit cost?

A cup of tea and a biscuit costs £1.30.  
A cup of tea costs 60p more than a biscuit.




How much does a biscuit cost?

#### Task 14 Prompts: Café calculations

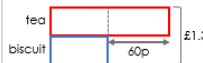
**SUPPORT**

**STEP 1:** tea + biscuit = £1.30

tea  £1.30

biscuit

**STEP 2:** tea 60p more than biscuit

tea  £1.30


biscuit

60p

This bar model is split into 3 sections.  
How big is each section?

**EXPLAIN**

**Explain the mistake:**

tea 65p  £1.30

biscuit 65p


60p

£1.30 ÷ 2 = 65p  
Tea = £1.05  
Biscuit = 65p

**EXTEND**

A cup of coffee and an apple costs £1.80.  
The cup of coffee costs three times as much as the apple.

How much does a cup of coffee cost?



## Task 1 Question: Sum of the digits

The sum of the digits for a whole-number is 6.

All the digits are different.

**What is the smallest that the number could be?**

**What is the largest that the number could be?**

*Example: the sum of the digits for 214 is 7 ( $2 + 1 + 4 = 7$ )*

The sum of the digits for a whole-number is 6.

All the digits are different.

**What is the smallest that the number could be?**

**What is the largest that the number could be?**

*Example: the sum of the digits for 214 is 7 ( $2 + 1 + 4 = 7$ )*

The sum of the digits for a whole-number is 6.

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*Example: the sum of the digits for 214 is 7 ( $2 + 1 + 4 = 7$ )*

The sum of the digits for a whole-number is 6.

All the digits are different.

**What is the smallest that the number could be?**

**What is the largest that the number could be?**

*Example: the sum of the digits for 214 is 7 ( $2 + 1 + 4 = 7$ )*



# Task 1 Prompts: Sum of the digits

S  
U  
P  
P  
O  
R  
T

## Examples:

24 is a 2-digit number. The sum of the digits is 6 ( $2 + 4 = 6$ ).

204 is a 3-digit number. The sum of the digits is 6 ( $2 + 0 + 4 = 6$ ).

**Tip for making the largest number:** *It's possible to make a 4-digit number where the sum of the digits is 6 **if you use small digits.***

E  
X  
P  
L  
A  
I  
N

## Agree or disagree:

*'To make a large number when the sum of the digits is 6, you need to use a 5.'*

*'To make a large number where the sum of the digits is 6, use as many digits as possible.'*

E  
X  
T  
E  
N  
D

The sum of the digits for a whole-number is 11.

All the digits are different.

**What is the largest that the number could be?**

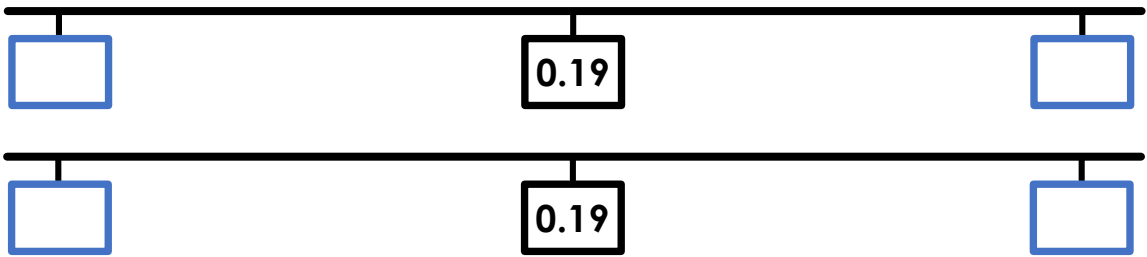
**What is the smallest that the number could be?**

# Task 2 Question: Decimal number line

0.19 is half-way between the numbers in the two blue boxes.

**What numbers could be in the blue boxes?**

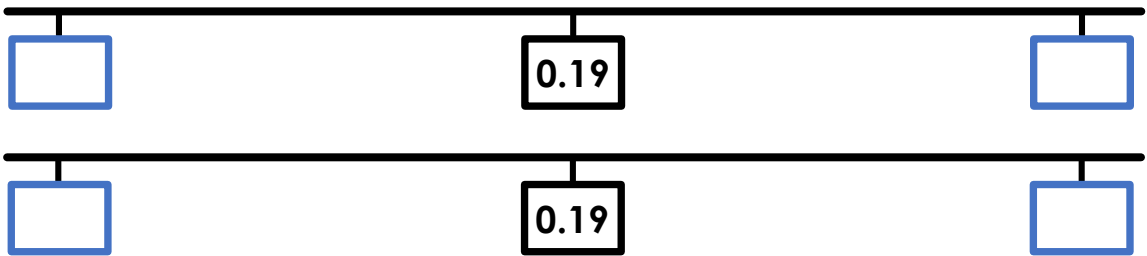
*Answer this question in two ways.*



0.19 is half-way between the numbers in the two blue boxes.

**What numbers could be in the blue boxes?**

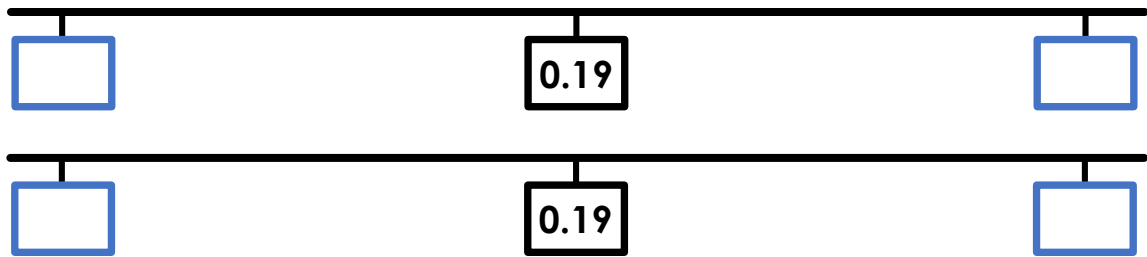
*Answer this question in two ways.*



0.19 is half-way between the numbers in the two blue boxes.

**What numbers could be in the blue boxes?**

*Answer this question in two ways.*





# Task 2 Prompts: Decimal number line

S  
U  
P  
P  
O  
R  
T

These examples show 1.9 in the middle box:



1.9 is half-way between 1.8 and 2

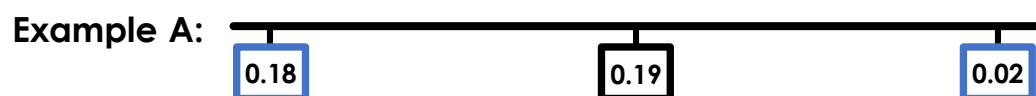


1.9 is half-way between 1.6 and 2.2

*For your question, 0.19 is in the middle box. Use these examples to help you answer your question.*

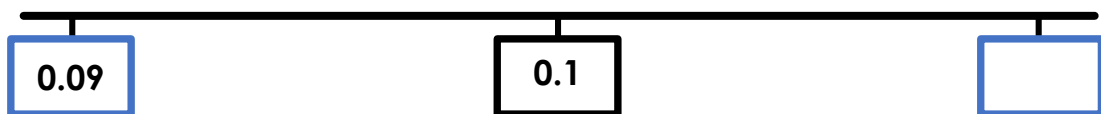
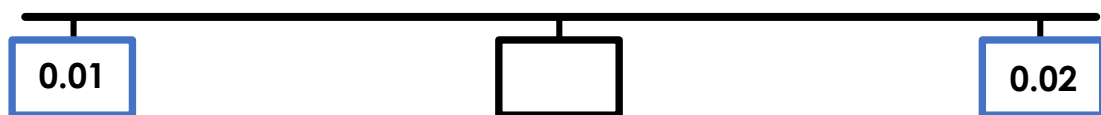
E  
X  
P  
L  
A  
I  
N

Explain the mistakes:



E  
X  
T  
E  
N  
D

On each example, the black box is half-way between the two blue boxes.  
Fill the gaps:



## Task 3 Question: Rounding money

Rounded to the nearest £10, Alex has £250.

Rounded to the nearest £100, Jim has £400.

*Alex and Jim have an exact amount in £ pounds.*

**What is the greatest possible difference between the amount of money that Alex and Jim have?**

Rounded to the nearest £10, Alex has £250.

Rounded to the nearest £100, Jim has £400.

*Alex and Jim have an exact amount in £ pounds.*

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*Alex and Jim have an exact amount in £ pounds.*

**What is the greatest possible difference between the amount of money that Alex and Jim have?**

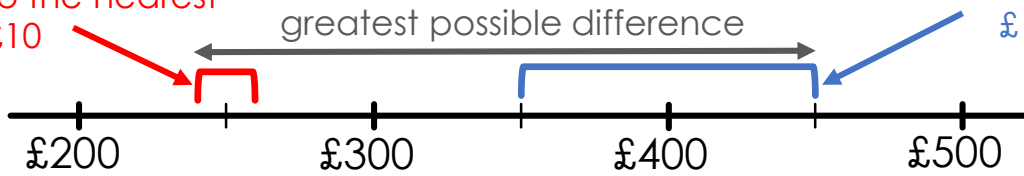
# Task 3 Prompts: Rounding money

S  
U  
P  
P  
O  
R  
T

This picture shows the greatest possible difference:

£250, rounded  
to the nearest  
£10

£400, rounded  
to the nearest  
£100



E  
X  
P  
L  
A  
I  
N

**What is the largest amount that Jim could have?**

- (a) £399
- (b) £404
- (c) £449

*Spot the correct answer.  
Explain the mistakes.*

E  
X  
T  
E  
N  
D

Jim has £98 more than Alex.

**How much money could Alex have?**

*List all possible amounts.*

## Task 4 Question: Rounding puzzles

**Part 1:** What is the largest whole number that, when rounded to the nearest 100, is 4000?

**Part 2:** What is the largest whole number that, when rounded to the nearest 200, is 4000?

**Part 1:** What is the largest whole number that, when rounded to the nearest 100, is 4000?

**Part 2:** What is the largest whole number that, when rounded to the nearest 200, is 4000?

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**Part 2:** What is the largest whole number that, when rounded to the nearest 200, is 4000?

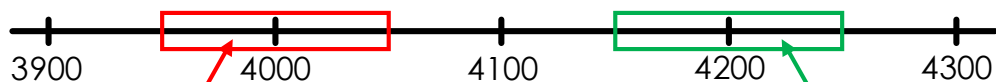
**Part 1:** What is the largest whole number that, when rounded to the nearest 100, is 4000?

**Part 2:** What is the largest whole number that, when rounded to the nearest 200, is 4000?

# Task 4 Prompts: Rounding puzzles

S  
U  
P  
P  
O  
R  
T

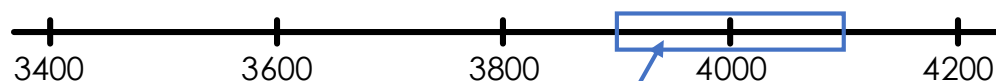
This number line counts in steps of 100:



**For numbers in this box, the nearest multiple of 100 is 4000.**  
*Example: 3982 is nearer to 4000 than 3900*

**For numbers in this box, the nearest multiple of 100 is 4200.**  
*Example: 4236 is nearer to 4200 than 4300*

This number line counts in steps of 200:



**For numbers in this box, the nearest multiple of 200 is 4000.**  
*Example: 3927 is nearer to 4000 than 3800*

E  
X  
P  
L  
A  
I  
N

Rounded to the nearest 10, 374 becomes **smaller** (it is 370).  
 Rounded to the nearest 100, 374 becomes **larger** (it is 400).

**Fill the gaps:**

When rounded to the nearest , 605 becomes **smaller**.

When rounded to the nearest , 605 becomes **larger**.

**Explain why.**

E  
X  
T  
E  
N  
D

**Round 2670 to the nearest:**

(a) 100

(b) 200

(c) 50

(d) 1000

**Challenge:** round 2670 to another number. The answer must be **different** than the answers to questions a→d.

# Task 5 Question: Negatives on number line

Look at this number line:



The number in the red box is **negative**.

**Which numbers could be in the red and blue boxes?**

*Challenge: think of two pairs of possible answers.*

Look at this number line:



The number in the red box is **negative**.

**Which numbers could be in the red and blue boxes?**

*Challenge: think of two pairs of possible answers.*

Look at this number line:



The number in the red box is **negative**.

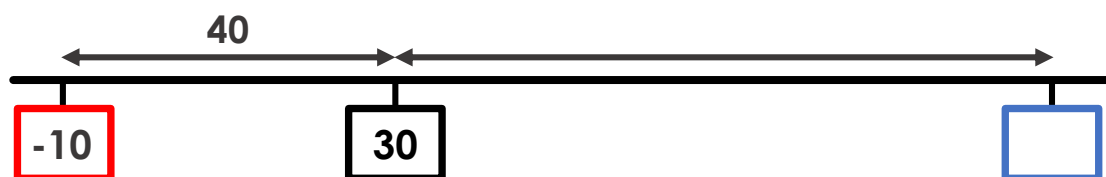
**Which numbers could be in the red and blue boxes?**

*Challenge: think of two pairs of possible answers.*

# Task 5 Prompts: Negatives on number line

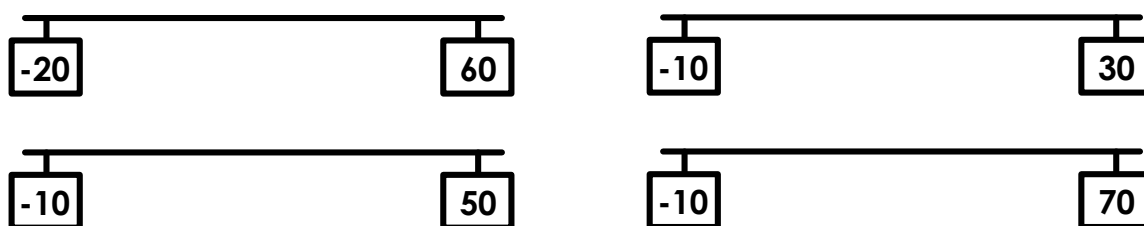
S  
U  
P  
P  
O  
R  
T

Part-finished example:



E  
X  
P  
L  
A  
I  
N

Mark the position of 20 on each number line. *What do you notice?*



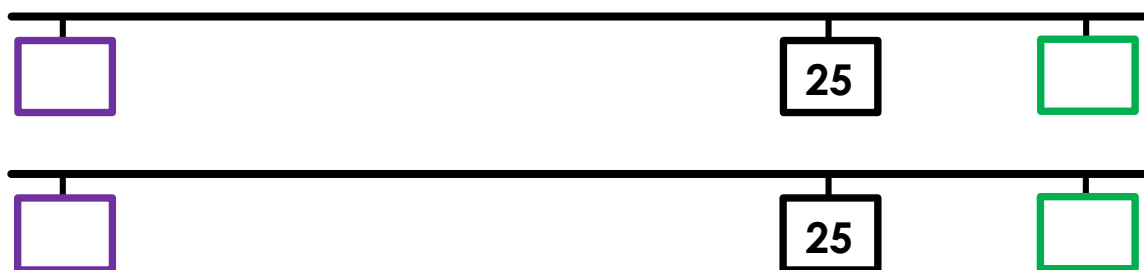
E  
X  
T  
E  
N  
D

The number in the purple box is negative.

25 is  $\frac{3}{4}$  of the distance from the purple box to the green box.

**What numbers could be in the purple and green boxes?**

*Think of two possible pairs of answers.*





## Task 6 Question: Number sequences

The first 3 terms of a sequence are positive whole numbers.

To find the next term in the sequence, the same number is subtracted.

-7 is the second **negative** number in the sequence.

**Write the first 3 terms of the sequence.**

*There are different possible ways!*

**Example sequence: 9, 7, 5...**

**The second negative number in this sequence is -3**

The first 3 terms of a sequence are positive whole numbers.

To find the next term in the sequence, the same number is subtracted.

-7 is the second **negative** number in the sequence.

**Write the first 3 terms of the sequence.**

*There are different possible ways!*

**Example sequence: 9, 7, 5...**

**The second negative number in this sequence is -3**

# Task 6 Prompts: Number sequences

S  
U  
P  
P  
O  
R  
T

**Tip 1:** make numbers in the sequence get smaller

10, 7, 4... ✓

4, 7, 10... ✗



Every number in this sequence will be positive

**Tip 2:** keep the difference between the numbers the same

10, 7, 4... ✓

10, 7, 3... ✗

**Tip 3:** the difference between the numbers is **more than 3**

10, 7, 4... ✗



The first two negative numbers in this sequence are -2 and -5

E  
X  
P  
L  
A  
I  
N

**Circle the sequences that will include the number 0:**

98, 91, 84...

725, 700, 675...

580, 540, 500...

**Explain how you know.**

E  
X  
T  
E  
N  
D

**Design a sequence that matches these rules:**

The first term in your sequence must be between 50 and 60.

To find the next term in the sequence, each time the same number is subtracted.

-11 is third negative number in the sequence.

**Write the first 3 terms of this sequence.**

## Task 7 Question: More, less, equal

$$10 - 8 < \square - \square$$

$$20 > \square \times 3$$

$$\square + 4 = 15 - \square$$

Fill the boxes, using each of these numbers once:

**4, 5, 6, 7, 8**

$$10 - 8 < \square - \square$$

$$20 > \square \times 3$$

$$\square + 4 = 15 - \square$$

Fill the boxes, using each of these numbers once:

**4, 5, 6, 7, 8**

$$10 - 8 < \square - \square$$

$$20 > \square \times 3$$

$$\square + 4 = 15 - \square$$

Fill the boxes, using each of these numbers once:

**4, 5, 6, 7, 8**

# Task 7 Prompts: More, less, equal

**SUPPORT** **Tip 1:** There is only one box where you can put the 8. Find it.

**Tip 2:** Work out which of the numbers **can't** go in this space.

$$20 > \boxed{\phantom{0}} \times 3$$

Where will you put the numbers that **can't** go in this box?

**EXPLAIN** Look at these answers to your question. **Spot the mistakes.**

**Mistake 1:**

$$10 - 8 < \boxed{8} - \boxed{7}$$

$$20 > \boxed{4} \times 3$$

$$\boxed{5} + 4 = 15 - \boxed{6}$$

**Mistake 2:**

$$10 - 8 < \boxed{8} - \boxed{4}$$

$$20 > \boxed{6} \times 3$$

$$\boxed{6} + 4 = 15 - \boxed{5}$$

*For this task, only use positive whole-numbers.*

Order the number sentences by the **number of possible answers** (from the fewest to the most possible answers).

$$8 \times \boxed{\phantom{0}} = 30 - \boxed{\phantom{0}}$$

$$53 - \boxed{\phantom{0}} = 48 + \boxed{\phantom{0}}$$

$$60 \div \boxed{\phantom{0}} = 10 + \boxed{\phantom{0}}$$

$$28 \div \boxed{\phantom{0}} = \boxed{\phantom{0}} \times 2$$

## Task 8 Question: Four number sentences

$$\square \times 3 = 18 + \square$$

$$2 < 9 - \square$$

$$\square \div 2 < 4$$

$$2 \times 2 \times 2 \times 2 < \square + 8$$

Fill the boxes, using each of these numbers once:

**3, 6, 7, 8, 9**

$$\square \times 3 = 18 + \square$$

$$2 < 9 - \square$$

$$\square \div 2 < 4$$

$$2 \times 2 \times 2 \times 2 < \square + 8$$

Fill the boxes, using each of these numbers once:

**3, 6, 7, 8, 9**

$$\square \times 3 = 18 + \square$$

$$2 < 9 - \square$$

$$\square \div 2 < 4$$

$$2 \times 2 \times 2 \times 2 < \square + 8$$

Fill the boxes, using each of these numbers once:

**3, 6, 7, 8, 9**

# Task 8 Prompts: Four number sentences

**SUPP** **Tip 1:** Only one of the numbers you were given can go here.

$$2 \times 2 \times 2 \times 2 < \boxed{\phantom{00}} + 8$$

**ORT** **Tip 2:** Work out if the number in this box more or less than 8.

$$\boxed{\phantom{00}} \div 2 < 4$$

**EXPL** Do you **agree or disagree** with these statements?

$$2 < 9 - \boxed{\phantom{00}}$$

**AI** **Mo:** 'The number red box must be less than 8.'

**IN** **Dan:** 'The number red box must be less than 6.'

**EXTEND** Which of these sets of numbers can be used to fill the gaps?

$$\boxed{\phantom{00}} \times 3 = 18 + \boxed{\phantom{00}}$$

$$2 < 9 - \boxed{\phantom{00}}$$

$$\boxed{\phantom{00}} \div 2 < 4$$

$$2 \times 2 \times 2 \times 2 < \boxed{\phantom{00}} + 8$$

**Set A:** 5, 6, 7, 8, 9

**Set B:** 9, 8, 7, 5, 3

**Set C:** 6, 6, 9, 9, 9

## Task 9 Question: Subtraction number sentences

$$H - 25 < 35$$

$$80 - H < 39$$

H is a multiple of 6

**Find all the possible values for H**

$$H - 25 < 35$$

$$80 - H < 39$$

H is a multiple of 6

**Find all the possible values for H**

$$H - 25 < 35$$

$$80 - H < 39$$

H is a multiple of 6

**Find all the possible values for H**

$$H - 25 < 35$$

$$80 - H < 39$$

H is a multiple of 6

**Find all the possible values for H**

$$H - 25 < 35$$

$$80 - H < 39$$

H is a multiple of 6

**Find all the possible values for H**



# Task 9 Prompts: Subtraction number sentences

S  
U  
P  
P  
O  
R  
T

$$60 - 25 = 35$$

$H - 25 < 35$  H must be  or less.

$$80 - 41 = 39$$

$80 - H < 39$  H must be  or more.

E  
X  
P  
L  
A  
I  
N

True or false? ✓ ✗

$$60 - 25 < 35$$

$$80 - 39 < 39$$

$$25 - 60 < 35$$

$$80 - 41 < 39$$

$$62 - 25 < 35$$

$$80 - 42 < 39$$

E  
X  
T  
E  
N  
D

Change one number used in the question.

Making this change means there are now

**three more** possible values for H.

Do in different ways.

## Task 10 Question: Missing digits addition

Fill in the missing digits in this calculation:

$$\square 8 \square + 3 \square 5 = 1052$$

Fill in the missing digits in this calculation:

$$\square 8 \square + 3 \square 5 = 1052$$

Fill in the missing digits in this calculation:

$$\square 8 \square + 3 \square 5 = 1052$$

Fill in the missing digits in this calculation:

$$\square 8 \square + 3 \square 5 = 1052$$

Fill in the missing digits in this calculation:

$$\square 8 \square + 3 \square 5 = 1052$$

# Task 10 Prompts: Missing digits addition

S  
U  
P  
P  
O  
R  
T

The hundreds value must be more than 5 to make a sum of 1052

$$\begin{array}{r} \boxed{\phantom{0}}8\boxed{\phantom{0}} \\ + 3\boxed{\phantom{0}}5 \\ \hline 1052 \end{array}$$

$\boxed{\phantom{0}} + 5 = 12$

E  
X  
P  
L  
A  
I  
N

Which of these calculations can be done in more than one way?

$$\begin{array}{r} \boxed{\phantom{0}}6\boxed{\phantom{0}} \\ + \boxed{\phantom{0}}\boxed{\phantom{0}}3 \\ \hline 345 \end{array}$$

$$\begin{array}{r} \boxed{\phantom{0}}\boxed{\phantom{0}}7 \\ + \boxed{\phantom{0}}3\boxed{\phantom{0}} \\ \hline 586 \end{array}$$

$$\begin{array}{r} \boxed{\phantom{0}}5\boxed{\phantom{0}} \\ + 4\boxed{\phantom{0}}8 \\ \hline 1148 \end{array}$$

E  
X  
T  
E  
N  
D

**Write a missing digits addition question. Requirements:**

- The calculation is a 3-digit number plus a 3-digit number.
- At least 3 of the digits are hidden. The sum is shown.
- Your question can be answered in more than one way.

**Example:**  $\boxed{\phantom{0}}8\boxed{\phantom{0}} + \boxed{\phantom{0}}\boxed{\phantom{0}}3 = 544$

Possible answers:  $181+363=544$ ,  $281+263=544$ ,  $381+163=544$

## Task 11 Question: Missing digits subtraction

Fill in the missing digits in this calculation:

$$6 \square 2 - \square 3 \square = 243$$

Fill in the missing digits in this calculation:

$$6 \square 2 - \square 3 \square = 243$$

Fill in the missing digits in this calculation:

$$6 \square 2 - \square 3 \square = 243$$

Fill in the missing digits in this calculation:

$$6 \square 2 - \square 3 \square = 243$$

Fill in the missing digits in this calculation:

$$6 \square 2 - \square 3 \square = 243$$

# Task 11 Prompts: Missing digits subtraction

SUPPORT

An example of a similar question, with the solution shown step-by-step:

**Question:**

$$\begin{array}{r} 4 \square 9 \\ - \square 7 \square \\ \hline 184 \end{array}$$

→

**Step 1:**

$$\begin{array}{r} 4 \square 9 \\ - \square 7 5 \\ \hline 184 \end{array}$$

*9 - 5 = 4*

→

**Step 2:**

$$\begin{array}{r} 3 \cancel{4} 5 9 \\ - \square 7 5 \\ \hline 184 \end{array}$$

*15 - 7 = 8*

→

**Step 3:**

$$\begin{array}{r} 3 \cancel{4} 5 9 \\ - 2 7 5 \\ \hline 184 \end{array}$$

*3 - 2 = 1*

EXPLAIN

**Complete these missing digit questions.**

*Which question did you find the most difficult? Explain your choice.*

**Question A:**

$$3 \square 7 - \square 5 \square = 183$$

**Question B:**

$$8 \square 9 - \square 2 \square = 237$$

EXTEND

**Complete the subtraction calculation using every digit 0-9.**

**Position the digits 0 and 8 as shown:**

$$\square 0 \square 8 - \square \square \square = \square \square \square$$

ADDITION AND SUBTRACTION
I SEE PROBLEM-SOLVING – UKS2

## Task 12 Question: Sum and difference

The sum of two numbers is 9.

The difference between these two numbers is 4.

**What are the numbers?**

The sum of two numbers is 9.

The difference between these two numbers is 4.

**What are the numbers?**

The sum of two numbers is 9.

The difference between these two numbers is 4.

**What are the numbers?**

The sum of two numbers is 9.

The difference between these two numbers is 4.

**What are the numbers?**

The sum of two numbers is 9.

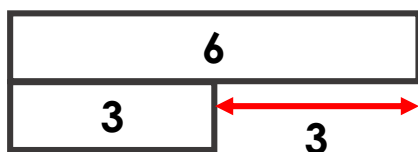
The difference between these two numbers is 4.

**What are the numbers?**

# Task 12 Prompts: Sum and difference

S  
U  
P  
P  
O  
R  
T

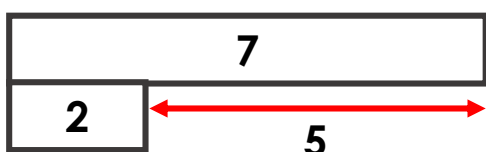
**6 and 3**



The sum of 6 and 3 is **9** ✓

The difference between 6 and 3 is **3** (too small) ✗

**7 and 2**



The sum of 7 and 2 is **9** ✓

The difference between 7 and 2 is **5** (too big) ✗

**Tip:** try a different way **using decimal numbers**

E  
X  
P  
L  
A  
I  
N

**8** and **4** have a sum of **12** and a difference of **4**.

and  have a sum of **14** and a difference of **4**.

and  have a sum of **14** and a difference of **8**.

**Explain how these questions are linked.**

*I knew that... so...*

*The only difference was...*

E  
X  
T  
E  
N  
D

**Agree or disagree?**

'The sum of two numbers is even. The difference between these numbers is 3. These numbers **can't** be whole numbers.'

'It's possible for the difference between two numbers to be the same as their sum.'



## Task 13 Question: Four numbers challenge

The sum of four whole numbers is 23.

The difference between the smallest and the largest number is 6.

All four numbers are different.

**What could the four numbers be?**

Find **all the possible answers** to this question.

The sum of four whole numbers is 23.

The difference between the smallest and the largest number is 6.

All four numbers are different.

**What could the four numbers be?**

Find **all the possible answers** to this question.

The sum of four whole numbers is 23.

The difference between the smallest and the largest number is 6.

All four numbers are different.

**What could the four numbers be?**

Find **all the possible answers** to this question.

# Task 13 Prompts: Four numbers challenge

S  
U  
P  
P  
O  
R  
T

**Tip:** Share 23 counters between four whiteboards.  
Each whiteboard represents one of the numbers.



smallest  
number



largest  
number



**Remember:** the difference between the smallest number and the largest number is 6.

E  
X  
P  
L  
A  
I  
N

**Explain how you know that this statement is correct:**

*'The largest number must be more than 7'*

E  
X  
T  
E  
N  
D

The sum of four numbers is 25. All four numbers are different.

The difference between the smallest and the largest number is 4.

All four numbers are multiples of 0.5

**What could the four numbers be?**

Find **all the possible answers** to this question.

**One answer: 4, 5.5, 7.5, 8**

## Task 14 Question: Café calculations

A cup of tea and a biscuit costs £1.30.

A cup of tea costs 60p more than a biscuit.

**How much does a biscuit cost?**



A cup of tea and a biscuit costs £1.30.

A cup of tea costs 60p more than a biscuit.

**How much does a biscuit cost?**



A cup of tea and a biscuit costs £1.30.

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**How much does a biscuit cost?**



A cup of tea and a biscuit costs £1.30.

A cup of tea costs 60p more than a biscuit.

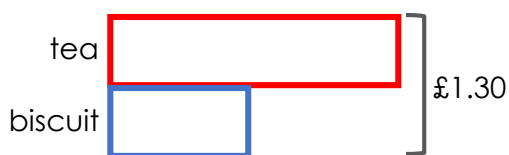
**How much does a biscuit cost?**



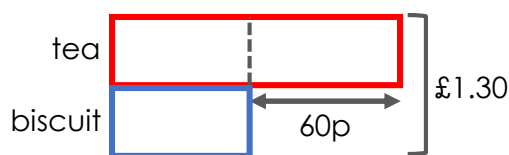
# Task 14 Prompts: Café calculations

S  
U  
P  
P  
O  
R  
T

**STEP 1:** tea + biscuit = £1.30



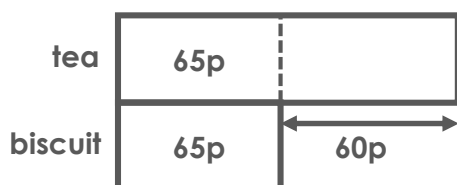
**STEP 2:** tea 60p more than biscuit



This bar model is split into 3 sections.  
**How big is each section?**

E  
X  
P  
L  
A  
I  
N

**Explain the mistake:**



$$£1.30 \div 2 = 65p$$

Tea = £1.05

Biscuit = 65p

E  
X  
T  
E  
N  
D

A cup of coffee and an apple costs £1.80.

The cup of coffee costs three times as much as the apple.

**How much does a cup of coffee cost?**



# Task 15 Question: Multiplication missing digits

What are the missing digits?

$$\begin{array}{r}
 6\Box \\
 \times \Box 3 \\
 \hline
 204 \\
 2720 \\
 \hline
 2924
 \end{array}$$

What are the missing digits?

$$\begin{array}{r}
 6\Box \\
 \times \Box 3 \\
 \hline
 204 \\
 2720 \\
 \hline
 2924
 \end{array}$$

What are the missing digits?

$$\begin{array}{r}
 6\Box \\
 \times \Box 3 \\
 \hline
 204 \\
 2720 \\
 \hline
 2924
 \end{array}$$

What are the missing digits?

$$\begin{array}{r}
 6\Box \\
 \times \Box 3 \\
 \hline
 204 \\
 2720 \\
 \hline
 2924
 \end{array}$$

# Task 15 Prompts: Multiplication missing digits

**SUPPORT**

**Tip 1:** Work out this digit first.

$6 \square \times 3 = 204$

$60 \times 3 = 180$

$180 + \square = 204$

$$\begin{array}{r} 6 \square \\ \times 3 \\ \hline 204 \\ 2720 \\ \hline 2924 \end{array}$$

**Tip 2:** Use estimates.

$60 \times 40 = 2400$

$60 \times 50 = 3000$

$70 \times 40 = 2800$

$70 \times 50 = 3500$

**EXPLAIN**

**Method 1:  $37 \times 24$**

	30	7
20	600	140
4	120	28

$$\begin{array}{r} 600 \\ 140 \\ 120 \\ 28 \\ \hline 888 \end{array}$$

**Method 2:  $37 \times 24$**

$$\begin{array}{r} 37 \\ \times 24 \\ \hline 148 \\ 740 \\ \hline 888 \end{array}$$

**What are the similarities and differences between these methods?**

**EXTEND**

$$\begin{array}{r} \square \square \\ \times \square 7 \\ \hline 322 \\ 3680 \\ \hline 4002 \end{array}$$

**What are the missing digits?**

*Describe the order in which you worked out the missing digits.*

# Task 16 Question: Remainder of one-half

Complete the calculation using digits 0 → 9. You can only use each digit once. Position the digits 1, 2 and 8 as shown.

$$\square\square \div \boxed{8} = \square \frac{\boxed{1}}{\boxed{2}}$$

**Level 1: I can find an answer**

**Level 2: I can find different answers**

**Level 3: I know how many possible answers there are**

Complete the calculation using digits 0 → 9. You can only use each digit once. Position the digits 1, 2 and 8 as shown.

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**Level 1: I can find an answer**

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Complete the calculation using digits 0 → 9. You can only use each digit once. Position the digits 1, 2 and 8 as shown.

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**Level 1: I can find an answer**

**Level 2: I can find different answers**

**Level 3: I know how many possible answers there are**



# Task 16 Prompts: Remainder of one-half

S  
U  
P  
P  
O  
R  
T

When dividing by 2, a remainder of 1 is equivalent to  $\frac{1}{2}$

**Example:**  $13 \div 2 = 6$  remainder 1 =  $6\frac{1}{2}$

When dividing by 4, a remainder of 2 is equivalent to  $\frac{1}{2}$

**Example:**  $26 \div 4 = 12$  remainder 2 =  $6\frac{1}{2}$

When dividing by 8, a remainder of 4 is equivalent to  $\frac{1}{2}$

**Example:**  $52 \div 8 = 6$  remainder 4 =  $6\frac{1}{2}$

E  
X  
P  
L  
A  
I  
N

**Agree or disagree:**

$$\boxed{\phantom{00}} \div 8 = 4\frac{1}{2}$$

$$\boxed{\phantom{00}} \div 4 = 8\frac{1}{2}$$

'The number in the blue box is the same as the number in the red box.'

E  
X  
T  
E  
N  
D

Complete the calculation using digits 0 → 9. You can only use each digit once. Position the digits 4 and 8 as shown.

$$\boxed{\phantom{0}}\boxed{\phantom{0}} \div \boxed{8} = \boxed{\phantom{0}}\frac{\boxed{\phantom{0}}}{\boxed{4}}$$

**Level 1:** I can find an answer

**Level 2:** I can find different answers

**Level 3:** I know how many possible answers there are

## Task 17 Question: Find the factors

**Which of the digits from 1 to 9 are factors of 532?**

*List the digits that you know are/aren't factors of 532 **without** having to do any calculations.*

**Which of the digits from 1 to 9 are factors of 532?**

*List the digits that you know are/aren't factors of 532 **without** having to do any calculations.*

**Which of the digits from 1 to 9 are factors of 532?**

*List the digits that you know are/aren't factors of 532 **without** having to do any calculations.*

**Which of the digits from 1 to 9 are factors of 532?**

*List the digits that you know are/aren't factors of 532 **without** having to do any calculations.*

**Which of the digits from 1 to 9 are factors of 532?**

*List the digits that you know are/aren't factors of 532 **without** having to do any calculations.*

## Task 17 Prompts: Find the factors

**Tip 1:** 532 has 2 ones. That helps us to know whether 2 and 5 are factors of 532.

**Tip 2:** use a related multiplication fact. For example,  $6 \times 90 = 540$ . Is 6 a factor of **532**?

**Tip 3:** for some digits it might be easier to perform a division calculation.

$532 \div 4 = 133$ . This shows that 4 is a factor of 532.

**Agree or disagree:**

*'We know that 4 is a factor of 532. This means that 8 must also be a factor of 532.'*

**List all the 2-digit factors of 288.**

Reasoning sentence stems:

*I know that  is a 2-digit factor of 288 so  must also be a factor of factor of 288.*

*The first 2-digit number I tried was... because...*

*I know I have found all the possible answers because...*

## Task 18 Question: Number detective

The sum of the digits in a 2-digit number is 13.

The number is a multiple of 4.

***What is the number?***

The sum of the digits in a 2-digit number is 13.

The number is a multiple of 4.

***What is the number?***

The sum of the digits in a 2-digit number is 13.

The number is a multiple of 4.

***What is the number?***

The sum of the digits in a 2-digit number is 13.

The number is a multiple of 4.

***What is the number?***

## Task 18 Prompts: Number detective

### S U P P O R T **Example:**

92 is a 2-digit number (the digits are 9 and 2)

92 is a multiple of 4 ( $23 \times 4 = 92$ )

The sum of the digits of 92 is 11 ( $9 + 2 = 11$ )

**Tip:** for your question, list the digits that add up to 13.

### E X P L A I N

The sum of the digits of 64 is 10.

'It's possible to keep the sum of the digits the same but change the size of the number by...'

**Find different ways.**

### E X T E N D

The sum of the digits of a 3-digit number is 3.

The number is a multiple of 3.

**List all the possible values for the number.**

## Task 19 Question: Athletics club ratios

In week 1 there were twice as many girls as boys at athletics club.

Six more girls join athletics club in week 2. Now for every boy at athletics club there are three girls.

**How many children go to athletics club in week 2?**

In week 1 there were twice as many girls as boys at athletics club.

Six more girls join athletics club in week 2. Now for every boy at athletics club there are three girls.

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Six more girls join athletics club in week 2. Now for every boy at athletics club there are three girls.

**How many children go to athletics club in week 2?**

# Task 19 Prompts: Athletics club ratios

S  
U  
P  
P  
O  
R  
T

**Week 1:**

Girls

Boys

Twice as many girls as boys.  
We **don't know** how many children in total yet.

**Week 2:**

Girls

Boys

girls that join

For every boy there are three girls.  
We **can** now work out how many children in total.

E  
X  
P  
L  
A  
I  
N

**Which answer?**

There are three times more boys than girls in tennis club. There are 36 children in total. **How many girls go to tennis club?**

**Is answer 1 correct?**

Boys

Girls

$$36 \div 4 = 9$$

**9 girls**

**Is answer 2 correct?**

Boys

Girls

$$36 \div 3 = 12$$

**12 girls**

E  
X  
T  
E  
N  
D

**Question 1:** In Carus Park School there are 3 girls for every 2 boys. There are 90 children in Carus Park School. **How many boys?**

**Question 2:** In Springvale School there are 3 boys for every 2 girls. There are 90 boys in Springvale School. **How many children?**

**Question 3:** In Mayfield School there are 3 girls for every 2 boys. There are 90 boys at Mayfield School. **How many girls?**

## Task 20 Question: Shot accuracy statistics

Julia Sanchez is a basketball player. Here are some statistics about her performance last season:

- She played 16 matches.
- On average, she scored 12 baskets per match.
- Last season, for every 3 shots she scored she missed one shot.

**How many times did Julia Sanchez shoot last season?**

Julia Sanchez is a basketball player. Here are some statistics about her performance last season:

- She played 16 matches.
- On average, she scored 12 baskets per match.
- Last season, for every 3 shots she scored she missed one shot.

**How many times did Julia Sanchez shoot last season?**

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- She played 16 matches.
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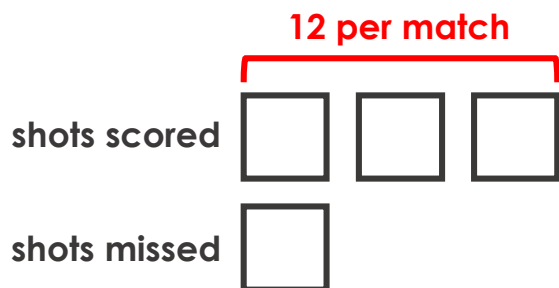
**How many times did Julia Sanchez shoot last season?**



# Task 20 Prompts: Shot accuracy statistics

This picture shows Julia's average shots per match.

S  
U  
P  
P  
O  
R  
T



12 shots scored per match.

shots missed per match.

shots taken per match.

Remember: Julia played 16 matches last season.

E  
X  
P  
L  
A  
I  
N

Which statistic is the **odd one out**?

Julia Sanchez scores  
3 shots for every shot  
that she misses.

Joy Ake misses  
one shot out of  
every 3 attempts.

Zoe Croft scores  
with 3 out of  
every 4 shots.

Explain how you know.

E  
X  
T  
E  
N  
D

In the first half, Zaynah Kamran scored 16 times. She scored with 4 shots for every shot that she missed.

In the second half, Zaynah scored with half of her shots.

Overall, Zaynah Kamran scored with 2 shots for every shot that she missed.

**How many shots did Zaynah take in the second half?**

## Task 21 Question: Pages read, pages left

I have read 40% of my book.

I have 90 pages left to read.

**How many pages have I read so far?**

I have read 40% of my book.

I have 90 pages left to read.

**How many pages have I read so far?**

I have read 40% of my book.

I have 90 pages left to read.

**How many pages have I read so far?**

I have read 40% of my book.

I have 90 pages left to read.

**How many pages have I read so far?**

I have read 40% of my book.

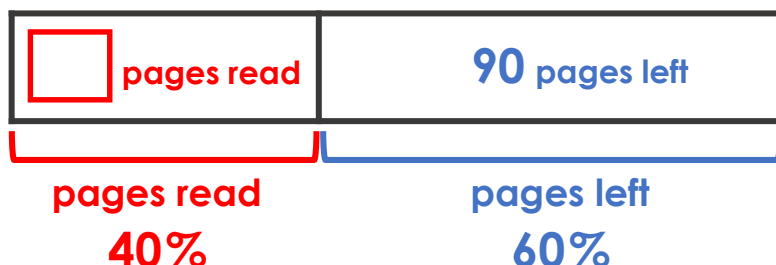
I have 90 pages left to read.

**How many pages have I read so far?**

# Task 21 Prompts: Pages read, pages left

S  
U  
P  
P  
O  
R  
T

This bar model represents the question:



90 pages = 60%

pages = 20%

pages = 40%

E  
X  
P  
L  
A  
I  
N

Explain the mistakes:

Mistake 1:

40% of 90 = 36

Answer: 36 pages

Mistake 2:

60% of the book is 90 pages

10% of the book is 15 pages

The whole book = 150 pages

Answer: 150 pages

E  
X  
T  
E  
N  
D

32 is 40% of 80

24 is 60% of

12 is  % of 30

is 80% of 70

## Task 22 Question: Clothes shop sales

A pair of trainers cost £32.

The shop had a sale.

Now the pair of trainers cost £24.

**What is the percentage discount?**

SALE PRICE

**£24**



A pair of trainers cost £32.

The shop had a sale.

Now the pair of trainers cost £24.

**What is the percentage discount?**

SALE PRICE

**£24**



A pair of trainers cost £32.

The shop had a sale.

Now the pair of trainers cost £24.

**What is the percentage discount?**

SALE PRICE

**£24**



A pair of trainers cost £32.

The shop had a sale.

Now the pair of trainers cost £24.

**What is the percentage discount?**

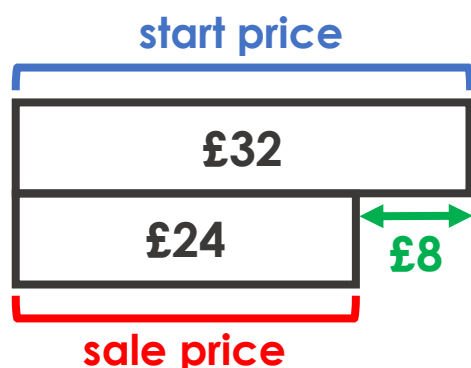
SALE PRICE

**£24**



# Task 22 Prompts: Clothes shop sales

S  
U  
P  
P  
O  
R  
T



**Tip:** think about how many lots of £8 in £32. This will allow you to work out the discount **as a fraction**. Then work out the percentage discount.

E  
X  
P  
L  
A  
I  
N

## Explain the mistake:

'The trainers are £8 cheaper in the sale. £8 is one-third of £24. One-third as a percentage is 33% so the answer is 33%.'

E  
X  
T  
E  
N  
D

All pairs of shoes are 25% cheaper in the sale.

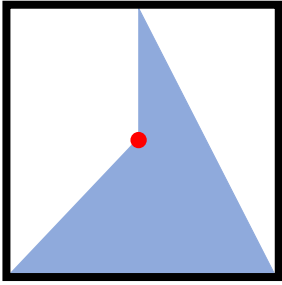
The sale price for these shoes is £48.

**How much did the shoes cost before the sale?**

SALE PRICE  
**£48**

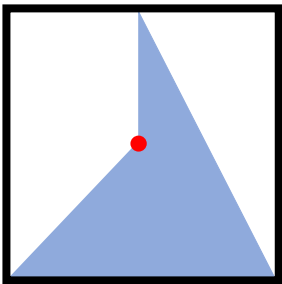


# Task 23 Question: Fraction of square



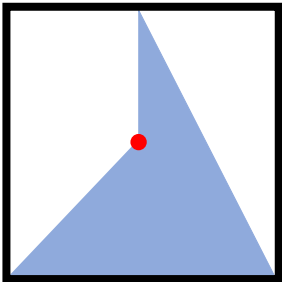
**What fraction of the square is blue?**

*The red spot is in the middle of the square.*



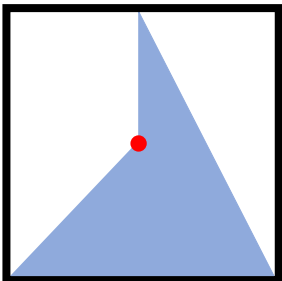
**What fraction of the square is blue?**

*The red spot is in the middle of the square.*



**What fraction of the square is blue?**

*The red spot is in the middle of the square.*



**What fraction of the square is blue?**

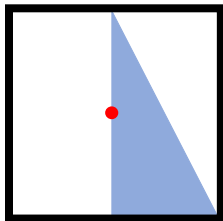
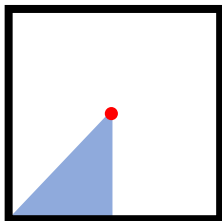
*The red spot is in the middle of the square.*

# Task 23 Prompts: Fraction of square

S  
U  
P  
P  
O  
R  
T

**Tip:**

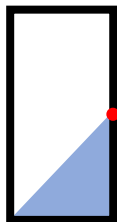
- Split the shape into two triangles.
- Each triangle is what fraction of the square?
- Add these fractions.



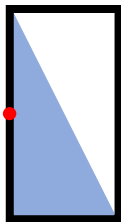
E  
X  
P  
L  
A  
I  
N

**Explain the mistake:**

'I split the shape into two triangles. I worked out the fraction of each triangle and added these fractions. The answer is  $\frac{3}{4}$ .



$$\frac{1}{4}$$

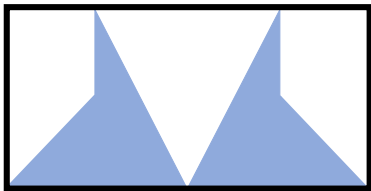


$$\frac{1}{2}$$

$$\frac{1}{4} + \frac{1}{2} = \frac{3}{4}$$

E  
X  
T  
E  
N  
D

**What fraction of each shape is shaded?**



## Task 24 Question: Adding fractions

$$\frac{\square}{6} + \frac{1}{\square} = \frac{\square}{3}$$

**The answer must be a proper fraction**

*Level 1: I can find a way*

*Level 2: I can find different ways*

*Level 3: I know how many ways there are*

$$\frac{\square}{6} + \frac{1}{\square} = \frac{\square}{3}$$

**The answer must be a proper fraction**

*Level 1: I can find a way*

*Level 2: I can find different ways*

*Level 3: I know how many ways there are*

$$\frac{\square}{6} + \frac{1}{\square} = \frac{\square}{3}$$

**The answer must be a proper fraction**

*Level 1: I can find a way*

*Level 2: I can find different ways*

*Level 3: I know how many ways there are*

$$\frac{\square}{6} + \frac{1}{\square} = \frac{\square}{3}$$

**The answer must be a proper fraction**

*Level 1: I can find a way*

*Level 2: I can find different ways*

*Level 3: I know how many ways there are*



# Task 24 Prompts: Adding fractions

S  
U  
P  
P  
O  
R  
T

**Example:**

This is  $\frac{2}{6}$  → 

This is  $\frac{1}{3}$  → 

**Draw**  $\frac{2}{6} + \frac{1}{3}$  → 

$$\frac{\boxed{2}}{6} + \frac{1}{\boxed{3}} = \frac{\boxed{\phantom{00}}}{3}$$

E  
X  
P  
L  
A  
I  
N

Which of the fractions below **can not** be used in this calculation?

$$\frac{1}{2}$$

$$\frac{1}{3}$$

$$\frac{1}{6}$$

$$\frac{1}{12}$$

$$\frac{\boxed{\phantom{00}}}{6} + \frac{1}{\boxed{\phantom{00}}} = \frac{\boxed{\phantom{00}}}{3}$$

**Explain why the fraction(s) you have chosen cannot be used.**

E  
X  
T  
E  
N  
D

**Look at this question:**

$$\frac{\boxed{\phantom{00}}}{4} + \frac{\boxed{\phantom{00}}}{8} = \frac{\boxed{\phantom{00}}}{12}$$

**Nick:** 'This is not possible because 8 is not a factor of 12.'

**Sam:** 'This can only be done by making  $\frac{6}{12}$  as this is one-half.'

**Jim:** 'There are different ways that this can be done.'

# Task 25 Question: Make one and a quarter

$$\frac{3}{\square} + \frac{\square}{\square} = 1\frac{1}{4}$$

The two fractions that are being added are proper fractions.

Level 1: I can find a way

Level 2: I can find three ways

$$\frac{3}{\square} + \frac{\square}{\square} = 1\frac{1}{4}$$

The two fractions that are being added are proper fractions.

Level 1: I can find a way

Level 2: I can find three ways

$$\frac{3}{\square} + \frac{\square}{\square} = 1\frac{1}{4}$$

The two fractions that are being added are proper fractions.

Level 1: I can find a way

Level 2: I can find three ways

$$\frac{3}{\square} + \frac{\square}{\square} = 1\frac{1}{4}$$

The two fractions that are being added are proper fractions.

Level 1: I can find a way

Level 2: I can find three ways

$$\frac{3}{\square} + \frac{\square}{\square} = 1\frac{1}{4}$$

The two fractions that are being added are proper fractions.

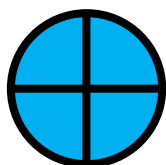
Level 1: I can find a way

Level 2: I can find three ways

# Task 25 Prompts: Make one and a quarter

S  
U  
P  
P  
O  
R  
T

**Tip 1:**



This is  $1\frac{1}{4}$

$1\frac{1}{4}$  is five quarters

**Tip 2:** position 6 as shown

$$\frac{3}{\boxed{6}} + \frac{\boxed{\phantom{00}}}{\boxed{\phantom{00}}} = 1\frac{1}{4}$$

E  
X  
P  
L  
A  
I  
N

Circle the fractions that are **more than 1 and less than 2**

$$\frac{8}{4}$$

$$\frac{15}{16}$$

$$\frac{19}{10}$$

$$\frac{7}{6}$$

$$\frac{6}{7}$$

**Explain your choices.**

E  
X  
T  
E  
N  
D

$$\frac{3}{\boxed{\phantom{00}}} + \frac{\boxed{\phantom{00}}}{8} = 1\frac{\boxed{\phantom{00}}}{4}$$

**The two fractions that are being added are proper fractions.**  
*Find all the possible answers.*

# Task 26 Question: Fractions of an amount

$$\frac{2}{\square} \text{ of } \square = 32$$

**Level 1:** I can find an answer

**Level 2:** I can find three different answers

$$\frac{2}{\square} \text{ of } \square = 32$$

**Level 1:** I can find an answer

**Level 2:** I can find three different answers

$$\frac{2}{\square} \text{ of } \square = 32$$

**Level 1:** I can find an answer

**Level 2:** I can find three different answers

$$\frac{2}{\square} \text{ of } \square = 32$$

**Level 1:** I can find an answer

**Level 2:** I can find three different answers

$$\frac{2}{\square} \text{ of } \square = 32$$

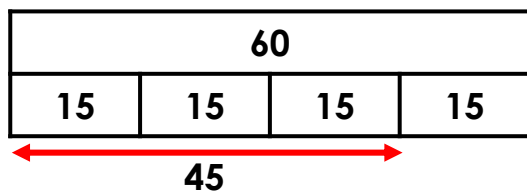
**Level 1:** I can find an answer

**Level 2:** I can find three different answers

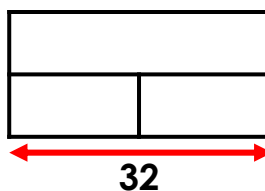
# Task 26 Prompts: Fractions of an amount

S  
U  
P  
P  
O  
R  
T

Bar model for  $\frac{3}{4}$  of 60 = 45



Part of bar model for  $\frac{2}{\square}$  of  $\square = 32$



E  
X  
P  
L  
A  
I  
N

$\frac{\square}{5}$  of  $\square = 60$

'When the number in the red box increases, the number in the blue box **increases/decreases**.'

Which is the correct word to finish this statement? Explain.

E  
X  
T  
E  
N  
D

**In how many ways** can the questions below be answered?

*Note: the fractions are always proper fractions.*

**Question A:**

$\frac{\square}{3}$  of  $\square = 60$

**Question B:**

$\frac{3}{\square}$  of  $\square = 60$

## Task 27 Question: Improper fractions

$$\frac{17}{\square} = 2 \frac{\square}{\square}$$

**Level 1:** I can find an answer

**Level 2:** I can find different answers

**Level 3:** I know how many possible answers there are

$$\frac{17}{\square} = 2 \frac{\square}{\square}$$

**Level 1:** I can find an answer

**Level 2:** I can find different answers

**Level 3:** I know how many possible answers there are

$$\frac{17}{\square} = 2 \frac{\square}{\square}$$

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**Level 2:** I can find different answers

**Level 3:** I know how many possible answers there are

$$\frac{17}{\square} = 2 \frac{\square}{\square}$$

**Level 1:** I can find an answer

**Level 2:** I can find different answers

**Level 3:** I know how many possible answers there are

$$\frac{17}{\square} = 2 \frac{\square}{\square}$$

**Level 1:** I can find an answer

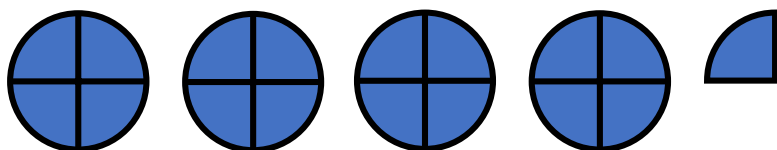
**Level 2:** I can find different answers

**Level 3:** I know how many possible answers there are

# Task 27 Prompts: Improper fractions

S  
U  
P  
P  
O  
R  
T

This is seventeen **quarters**:



$$\frac{17}{4} = 4\frac{1}{4}$$

When the denominator used is **4**, there are 4 whole circles and one quarter.

*This is too many whole circles. To answer the question, try a different denominator. **Will the denominator will be larger or smaller than 4?***

E  
X  
P  
L  
A  
I  
N

Circle the fractions that are **more than 3 and less than 4**.

$$\frac{14}{3}$$

$$\frac{14}{4}$$

$$\frac{21}{7}$$

$$\frac{11}{3}$$

$$\frac{19}{5}$$

**Explain how you know.**

E  
X  
T  
E  
N  
D

Fill in the missing numerators so the fractions are written **in order of size**, from smallest to largest:

$$\frac{21}{5}$$

$$\frac{\boxed{\phantom{000}}}{6}$$

$$\frac{\boxed{\phantom{000}}}{7}$$

$$\frac{39}{8}$$

smallest

largest

## Task 28 Question: Make two and a quarter

$$\frac{\square}{\square} \times \square = 2\frac{1}{4}$$

**Level 1:** I can find an answer

**Level 2:** I can find three different answers

$$\frac{\square}{\square} \times \square = 2\frac{1}{4}$$

**Level 1:** I can find an answer

**Level 2:** I can find three different answers

$$\frac{\square}{\square} \times \square = 2\frac{1}{4}$$

**Level 1:** I can find an answer

**Level 2:** I can find three different answers

$$\frac{\square}{\square} \times \square = 2\frac{1}{4}$$

**Level 1:** I can find an answer

**Level 2:** I can find three different answers

$$\frac{\square}{\square} \times \square = 2\frac{1}{4}$$

**Level 1:** I can find an answer

**Level 2:** I can find three different answers



# Task 28 Prompts: Make two and a quarter

SUPPORT

Two and a quarter:

Two and a quarter is    quarters

Two and a quarter is    eighths

Two and a quarter is    lots of  $\frac{3}{4}$

EXPLAIN

Is it the same?

EXTEND

proper fraction

/

8

×

single-digit number

=

3  $\frac{3}{4}$

*Level 1: I can find an answer*

*Level 2: I can find different answers*

*Level 3: I know how many possible answers there are*

## Task 29 Question: Part-finished book

Megan has read  $\frac{3}{5}$  of her book.

She has 90 pages left to read.

**How many pages long is her book?**

Megan has read  $\frac{3}{5}$  of her book.

She has 90 pages left to read.

**How many pages long is her book?**

Megan has read  $\frac{3}{5}$  of her book.

She has 90 pages left to read.

**How many pages long is her book?**

Megan has read  $\frac{3}{5}$  of her book.

She has 90 pages left to read.

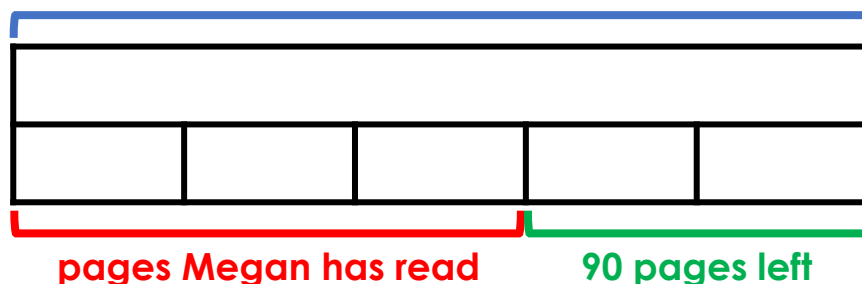
**How many pages long is her book?**

# Task 29 Prompts: Part-finished book

S  
U  
P  
P  
O  
R  
T

Bar model:

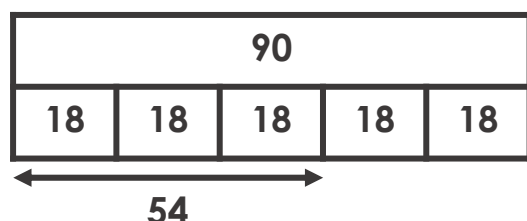
total pages



E  
X  
P  
L  
A  
I  
N

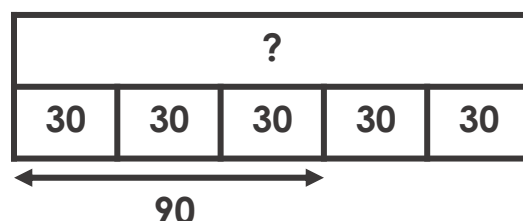
Explain the mistakes:

Mistake 1



$$\frac{3}{5} \text{ of } 90 = \underline{54 \text{ pages}}$$

Mistake 2



$$\frac{3}{5} = 90 \quad \text{so} \quad \frac{1}{5} = 30$$

$$30 \times 5 = \underline{150 \text{ pages}}$$

E  
X  
T  
E  
N  
D

Sam is reading two books: 'Olympic Stories' and 'Jack's Big Surprise'.

He has read  $\frac{3}{4}$  of Olympic Stories.

He has read  $\frac{3}{5}$  of Jack's Big Surprise.

He has 60 pages left to read of each book.

**How many pages long is each book?**

## Task 30 Question: Fractions and decimals

How many fractions can be made that are more than 0.5 and less than 0.8 using two of these digits?

**2, 3, 4, 5**

How many fractions can be made that are more than 0.5 and less than 0.8 using two of these digits?

**2, 3, 4, 5**

How many fractions can be made that are more than 0.5 and less than 0.8 using two of these digits?

**2, 3, 4, 5**

How many fractions can be made that are more than 0.5 and less than 0.8 using two of these digits?

**2, 3, 4, 5**

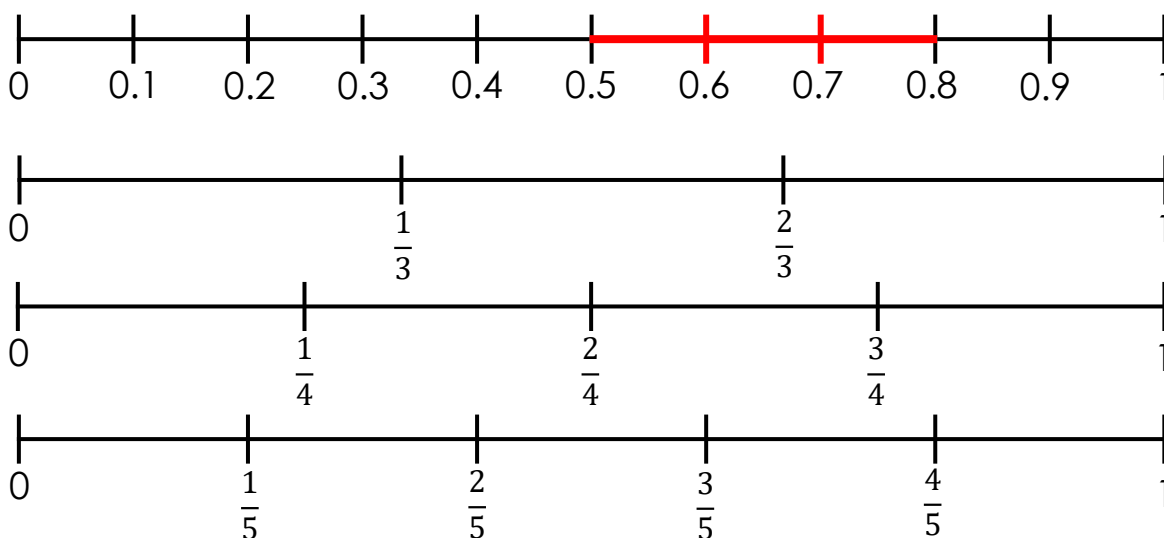
How many fractions can be made that are more than 0.5 and less than 0.8 using two of these digits?

**2, 3, 4, 5**

# Task 30 Prompts: Fractions and decimals

S  
U  
P  
P  
O  
R  
T

The number lines help to show fractions between 0.5 and 0.8:



E  
X  
P  
L  
A  
I  
N

Circle the correct fraction to decimal conversions.

**Explain the mistakes.**

$$\frac{3}{4} = 0.34$$

$$\frac{4}{5} = 0.6$$

$$\frac{1}{5} = 0.2$$

$$\frac{3}{4} = 0.75$$

$$\frac{1}{3} = 0.3$$

E  
X  
T  
E  
N  
D

How many fractions can be made that are more than 0.5 and less than 0.8 using the following numbers:

**4, 5, 6, 8, 10, 12**

## Task 31 Question: Combined weights

Ben and Sam weigh 90kg in total.  
 Jack and Ben weigh 100kg in total.  
 Sam and Jack weigh 80kg in total.  
**How much does Sam weigh?**

Ben and Sam weigh 90kg in total.  
 Jack and Ben weigh 100kg in total.  
 Sam and Jack weigh 80kg in total.  
**How much does Sam weigh?**

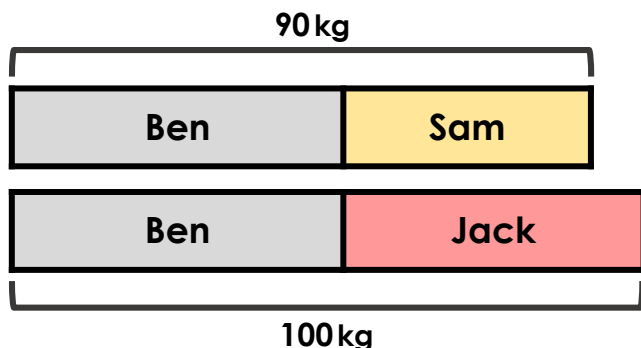
Ben and Sam weigh 90kg in total.  
 Jack and Ben weigh 100kg in total.  
 Sam and Jack weigh 80kg in total.  
**How much does Sam weigh?**

Ben and Sam weigh 90kg in total.  
 Jack and Ben weigh 100kg in total.  
 Sam and Jack weigh 80kg in total.  
**How much does Sam weigh?**

# Task 31 Prompts: Combined weights

Compare the weight of Sam and Jack:

S  
U  
P  
P  
O  
R  
T



Ben and Sam weigh 90kg

Ben and Jack weigh 100kg

weighs  kg more than

**Remember:** Sam and Jack weigh 80kg in total.

E  
X  
P  
L  
A  
I  
N

Stan is taller than Zack.

Stan is shorter than Tim.

Zack is  than Tim.

**Fill in the missing word.**

*Explain your choice.*

E  
X  
T  
E  
N  
D

**Julie and Steph weigh 80kg in total.**

**Alice and Julie weigh 80kg in total.**

**Agree or disagree:**

*'Alice, Julie and Steph must all weigh 40kg.'*

*Steph and Alice must weigh the same.'*

*Julie and Steph must weigh the same.'*

## Task 32 Question: Sports ball weights

A golf ball and a tennis ball weigh 104g in total.

A tennis ball and a cricket ball weigh 218g in total.

A tennis ball, a golf ball and a cricket ball weigh 264g in total.

**How heavy is a cricket ball?**

A golf ball and a tennis ball weigh 104g in total.

A tennis ball and a cricket ball weigh 218g in total.

A tennis ball, a golf ball and a cricket ball weigh 264g in total.

**How heavy is a cricket ball?**

A golf ball and a tennis ball weigh 104g in total.

A tennis ball and a cricket ball weigh 218g in total.

A tennis ball, a golf ball and a cricket ball weigh 264g in total.

**How heavy is a cricket ball?**

A golf ball and a tennis ball weigh 104g in total.

A tennis ball and a cricket ball weigh 218g in total.

A tennis ball, a golf ball and a cricket ball weigh 264g in total.

**How heavy is a cricket ball?**



# Task 32 Prompts: Sports ball weights

S  
U  
P  
P  
O  
R  
T

**Tip:** start by working out the weight of a golf ball

$218\text{g}$

tennis ball	cricket ball	
tennis ball	cricket ball	golf ball

$264\text{g}$

E  
X  
P  
L  
A  
I  
N

A lacrosse ball and a baseball weigh 295g in total.  
 A baseball and hockey ball weigh 305g in total.

**Agree or disagree:**

*'This shows that a lacrosse ball is lighter than a baseball.'*

*'This shows that a hockey ball is heavier than a lacrosse ball.'*

E  
X  
T  
E  
N  
D

A football and a volleyball weigh 700g in total.  
 A netball and a football weigh 850g in total.  
 A volleyball and a netball weigh 690g in total.

**How heavy is a volleyball?**

## Task 33 Question: Hiring a surfboard

**It costs £7 to hire a surfboard plus £3 per half-hour used.**

Kate goes surfing for 3 hours. It costs her  to hire the surfboard.

Jack goes surfing for  hours. It costs him £34 to hire the surfboard.

**It costs £7 to hire a surfboard plus £3 per half-hour used.**

Kate goes surfing for 3 hours. It costs her  to hire the surfboard.

Jack goes surfing for  hours. It costs him £34 to hire the surfboard.

**It costs £7 to hire a surfboard plus £3 per half-hour used.**

Kate goes surfing for 3 hours. It costs her  to hire the surfboard.

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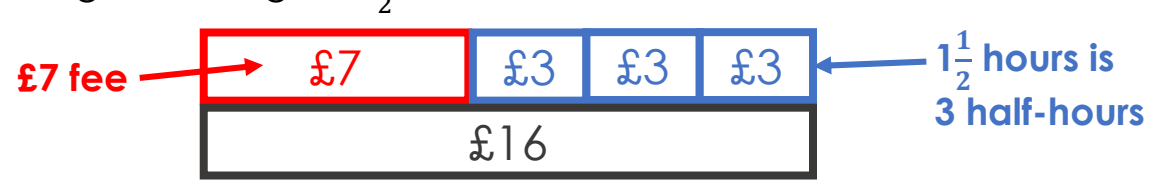
**It costs £7 to hire a surfboard plus £3 per half-hour used.**

Kate goes surfing for 3 hours. It costs her  to hire the surfboard.

Jack goes surfing for  hours. It costs him £34 to hire the surfboard.

# Task 33 Prompts: Hiring a surfboard

**S** **Example:**  
**U** Nia goes surfing for  $1\frac{1}{2}$  hours.  
**P**  
**P**  
**O**  
**R**  
**T**



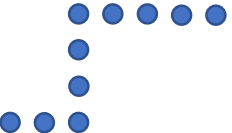




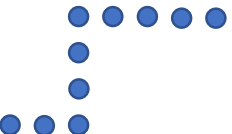
It costs her **£16** to hire the surfboard.



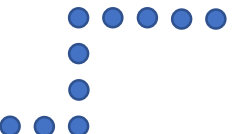
**E**  
**X** Imagine that the prices were changed to the following:  
**P**  
**L** **It costs £10 to hire a surfboard plus £2.50 per half-hour used.**  
**A**  
**I** ***Is it now cheaper or more expensive to hire a surfboard?***  
**N**



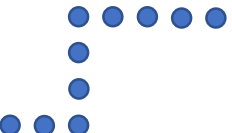
**E** Raja goes surfing for 3 hours 45 minutes. He expected to pay £29.50.  
**X**  
**T** The shopkeeper charges him £31. They argue about the cost.  
**E** **Why did Raja think it would cost £29.50?**  
**N** **Why did the shopkeeper charge £31?**  
**D**

# Task 34 Question: Dot pattern sequence

<p><b>Picture 1:</b></p>  <p><b>4 dots</b></p>	<p><b>Picture 2:</b></p>  <p><b>7 dots</b></p>	<p><b>Picture 3:</b></p>  <p><b>10 dots</b></p>	<p>How many dots are there in:</p> <p>(a) Picture 8</p> <p>(b) Picture 16</p>
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<p><b>Picture 1:</b></p>  <p><b>4 dots</b></p>	<p><b>Picture 2:</b></p>  <p><b>7 dots</b></p>	<p><b>Picture 3:</b></p>  <p><b>10 dots</b></p>	<p>How many dots are there in:</p> <p>(a) Picture 8</p> <p>(b) Picture 16</p>
---	---	--	---

<p><b>Picture 1:</b></p>  <p><b>4 dots</b></p>	<p><b>Picture 2:</b></p>  <p><b>7 dots</b></p>	<p><b>Picture 3:</b></p>  <p><b>10 dots</b></p>	<p>How many dots are there in:</p> <p>(a) Picture 8</p> <p>(b) Picture 16</p>
---	---	--	---

<p><b>Picture 1:</b></p>  <p><b>4 dots</b></p>	<p><b>Picture 2:</b></p>  <p><b>7 dots</b></p>	<p><b>Picture 3:</b></p>  <p><b>10 dots</b></p>	<p>How many dots are there in:</p> <p>(a) Picture 8</p> <p>(b) Picture 16</p>
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# Task 34 Prompts: Dot pattern sequence

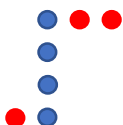
S  
U  
P  
P  
O  
R  
T

Picture 1:



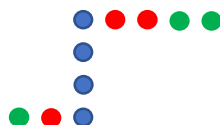
4 dots

Picture 2:



7 dots

Picture 3:



10 dots

**Notice:** There are 4 dots in the first pattern. Each time, 3 dots are added to make the next picture.

E  
X  
P  
L  
A  
I  
N

Which sequence is the odd one out?

4, 7, 10...

4, 8, 12...

3, 6, 9...

Think of a reason why **each sequence** could be the odd one out.

E  
X  
T  
E  
N  
D

**Agree or disagree?**

**Kara:** 'There are 10 dots in the 3<sup>rd</sup> picture, so in the 9<sup>th</sup> picture there will be 30 dots.'

**Lena:** 'If you continue the pattern, there will be a picture with 361 dots.'

## Task 35 Question: My secret number

I have a secret number. I multiply my secret number by 3 and add 7. This makes a whole number in the 20s (20→29).

**What could my secret number be?**

*Find all the possible values for the secret number.*

I have a secret number. I multiply my secret number by 3 and add 7. This makes a whole number in the 20s (20→29).

**What could my secret number be?**

*Find all the possible values for the secret number.*

I have a secret number. I multiply my secret number by 3 and add 7. This makes a whole number in the 20s (20→29).

**What could my secret number be?**

*Find all the possible values for the secret number.*

I have a secret number. I multiply my secret number by 3 and add 7. This makes a whole number in the 20s (20→29).

**What could my secret number be?**

*Find all the possible values for the secret number.*

# Task 35 Prompts: My secret number

S  
U  
P  
P  
O  
R  
T

The secret number is **not 3**

3	3	3	7
16			

This number is below 20

The secret number is **not 10**

10	10	10	7
37			

This number is above 29

E  
X  
P  
L  
A  
I  
N

I have a secret number. I multiply my secret number by 3 and **subtract** 7. This makes a whole number in the 20s (20→29).

**What could my secret number be?**

*How many possible values are there for the secret number now?*

E  
X  
T  
E  
N  
D

I have a secret number.

I multiply my secret number by  and subtract .

This makes a whole number in the 40s (40→49).

**Fill in the red boxes so there are two possible values for the secret number.**

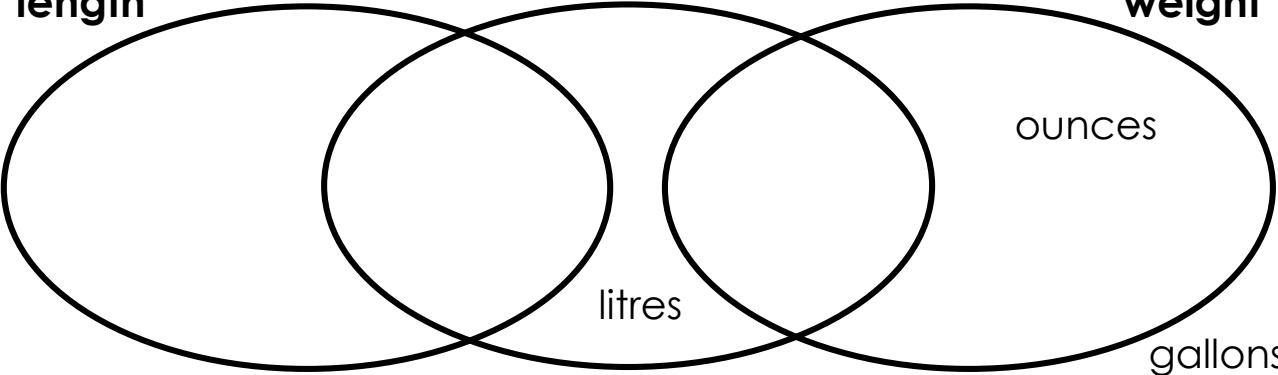
# Task 36 Question: Sorting measures

Write different measures in each section of the Venn Diagram:

measures of length

metric measures

measures of weight

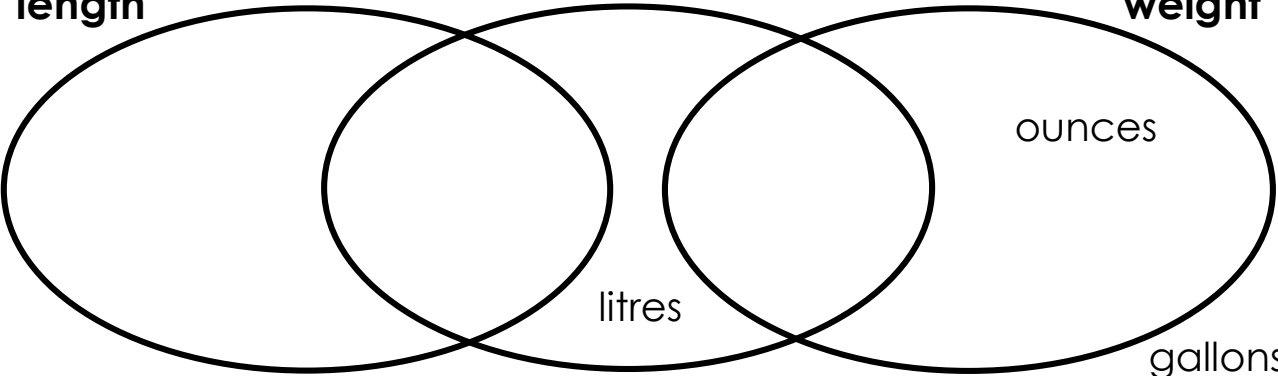


Write different measures in each section of the Venn Diagram:

measures of length

metric measures

measures of weight





# Task 36 Prompts: Sorting measures

S  
U  
P  
P  
O  
R  
T

**Example measures to include in Venn Diagram:**

stones	millilitres	inches
miles	metres	grams
pints	hours	kilometres

E  
X  
P  
L  
A  
I  
N

Which of these measure is the **odd one out**?

**yards                      millimetres                      kilograms**

*Think of a reason why two of the measures could be the odd one out.*

*The odd one out could be... because...*

*The odd one out could also be... because...*

E  
X  
T  
E  
N  
D

Draw lines to match each unit to the correct form of measure:

<b>decade</b>	<b>temperature</b>
<b>lux</b>	<b>time</b>
<b>light year</b>	<b>length</b>
<b>centigrade</b>	<b>light</b>
<b>acre</b>	<b>area</b>

**Explain:** do light years measure length, brightness of light or time? Give an example of something that is measured in light years.

## Task 37 Question: Time spent driving

Lorna has a  $\frac{3}{4}$  hour drive to work. She works every day from Monday to Friday, although she only works until lunchtime on Wednesday.

**How long, in hours and minutes, does she spend driving to work each week?**

Lorna has a  $\frac{3}{4}$  hour drive to work. She works every day from Monday to Friday, although she only works until lunchtime on Wednesday.

**How long, in hours and minutes, does she spend driving to work each week?**

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**How long, in hours and minutes, does she spend driving to work each week?**

# Task 37 Prompts: Time spent driving

S  
U  
P  
P  
O  
R  
T

**Tip 1:** Lorna **does not** spend  $\frac{3}{4}$  hour driving each day. Why?

**Tip 2:** Think about whether the amount of driving Lorna does on Wednesday is the same or different than other working days.

**Tip 3:**  $\frac{3}{4}$  hour =  minutes

E  
X  
P  
L  
A  
I  
N

**Explain the mistakes:**

**Mistake 1:**

$$\frac{3}{4} \times 5 = \frac{15}{4}$$

$$\frac{15}{4} = 3\frac{3}{4} \text{ hours}$$

**Mistake 2:**

$$\frac{3}{4} \times 10 = \frac{30}{4}$$

$$= 8 \text{ hours } 30 \text{ mins}$$

**Mistake 3:**

$$\begin{aligned} &45 \text{ minutes} \times 10 \\ &= 450 \text{ minutes} \\ &= 4 \text{ hours } 50 \text{ mins} \end{aligned}$$

E  
X  
T  
E  
N  
D

As well as not working over the weekend, Lorna has 35 days of holiday per year (this includes Bank Holidays).

**How many hours does Lorna spend driving to work per year?**

## Task 38 Question: Lengths of time

**Order these lengths of time from the shortest to the longest:**

5400 minutes       $\frac{1}{2}$  week      72 hours      4 days

**Order these lengths of time from the shortest to the longest:**

5400 minutes       $\frac{1}{2}$  week      72 hours      4 days

**Order these lengths of time from the shortest to the longest:**

5400 minutes       $\frac{1}{2}$  week      72 hours      4 days

**Order these lengths of time from the shortest to the longest:**

5400 minutes       $\frac{1}{2}$  week      72 hours      4 days

**Order these lengths of time from the shortest to the longest:**

5400 minutes       $\frac{1}{2}$  week      72 hours      4 days

# Task 38 Prompts: Lengths of time

S  
U  
P  
P  
O  
R  
T

**Tip:** convert all the lengths of time into hours.

**Example converting days to hours:**

24 hours in a day.  $5\frac{1}{2}$  days = 132 hours ( $5\frac{1}{2} \times 24 = 132$ )

**Example converting minutes to hours:**

60 minutes in an hour. 960 minutes = 16 hours ( $960 \div 60 = 16$ )

E  
X  
P  
L  
A  
I  
N

These questions are about converting between units of time.

**Answer the questions** and **rank the questions by difficulty.**

60 hours =  days

60 seconds =  minutes

60 days =  weeks

60 days =  months

*Explain your choices.*

E  
X  
T  
E  
N  
D

At the exact moment you first read this question,  
Rex the puppy was 198 hours old.

**When was he born?**

*Make your answer as accurate as possible.*

## Task 39 Question: Ticket prices

It costs **£14.10** for **an adult and a child** ticket to the zoo.

It costs **£23.50** for **an adult and three child** tickets to the zoo.

**What is the cost for one child ticket at the zoo?**

It costs **£14.10** for **an adult and a child** ticket to the zoo.

It costs **£23.50** for **an adult and three child** tickets to the zoo.

**What is the cost for one child ticket at the zoo?**

It costs **£14.10** for **an adult and a child** ticket to the zoo.

It costs **£23.50** for **an adult and three child** tickets to the zoo.

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It costs **£14.10** for **an adult and a child** ticket to the zoo.

It costs **£23.50** for **an adult and three child** tickets to the zoo.

**What is the cost for one child ticket at the zoo?**

# Task 39 Prompts: Ticket prices

S  
U  
P  
P  
O  
R  
T

**£14.10**

Adult	Child
-------	-------

**Tip:** look at the difference between the prices.

Adult	Child	Child	Child
-------	-------	-------	-------

**£23.50**

E  
X  
P  
L  
A  
I  
N

## Aquarium Prices:

Adult ticket: £12.80

Child ticket £5.30

Family ticket: £40 (2 adults + all children)

### Complete the statement:

'A family with two adults should buy a family ticket if they take  or more children to the Aquarium.'

E  
X  
T  
E  
N  
D

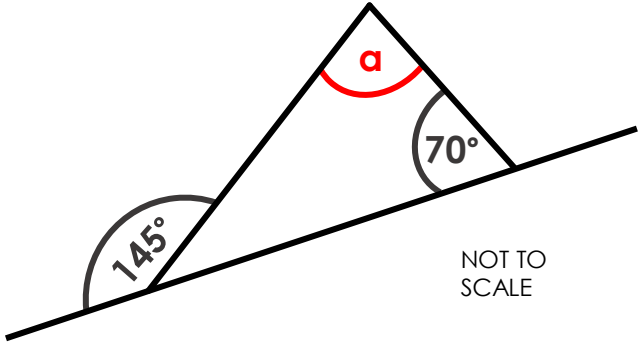
It costs **£14.60** for **two adult and one child** tickets at the cinema.

It costs **£23.60** for **three adult and two child** tickets at the cinema.

**What is the cost for one adult cinema ticket?**

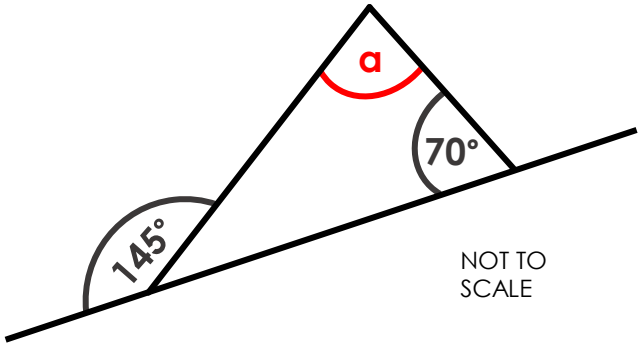
*Tip: consider the difference between these total costs*

# Task 40 Question: Missing angles



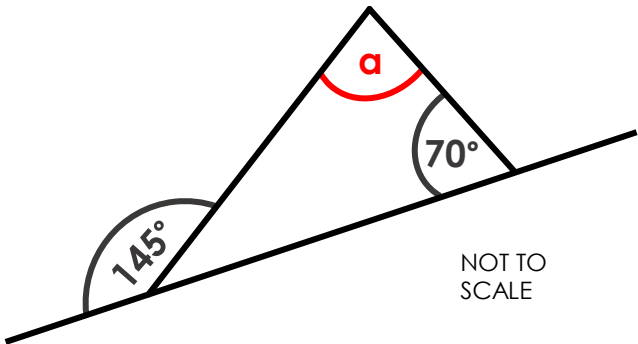
NOT TO SCALE

What is the size of angle  $a$ ?



NOT TO SCALE

What is the size of angle  $a$ ?



NOT TO SCALE

What is the size of angle  $a$ ?



# Task 40 Prompts: Missing angles

**S**  
**U**  
**P**  
**P**  
**O**  
**R**  
**T**

**Step 1:**

**Step 2:**

The bar model may help you to calculate angle a.

180°		
	70°	

**E**  
**X**  
**P**  
**L**  
**A**  
**I**  
**N**

**True or false?    ✓    ✗**

$a + b + c = 180^\circ$

$a + b + c + d = 180^\circ$

$a + b + c + d = 360^\circ$

$c + d = 180^\circ$

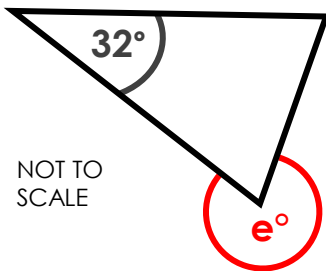
**E**  
**X**  
**T**  
**E**  
**N**  
**D**

NOT TO SCALE

**What is the size of angle b?**

*How many calculations are needed to work it out?*

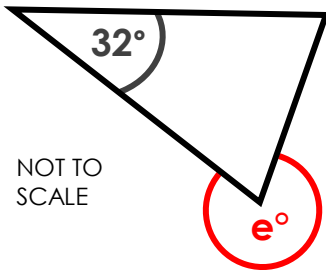
# Task 41 Question: Isosceles triangle angles



NOT TO SCALE

This is an isosceles triangle.

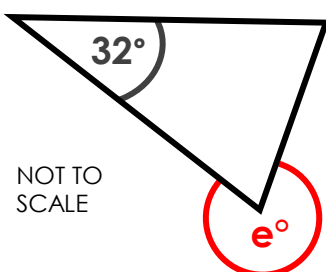
**What is the size of angle e?**



NOT TO SCALE

This is an isosceles triangle.

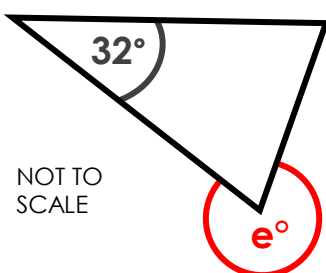
**What is the size of angle e?**



NOT TO SCALE

This is an isosceles triangle.

**What is the size of angle e?**



NOT TO SCALE

This is an isosceles triangle.

**What is the size of angle e?**

# Task 41 Prompts: Isosceles triangle angles

S  
U  
P  
P  
O  
R  
T

**Tip 1:**

These angles are the same size

**Tip 2:**

You are working out how much less than 360° this angle is.

E  
X  
P  
L  
A  
I  
N

isosceles triangles

NOT TO SCALE

NOT TO SCALE

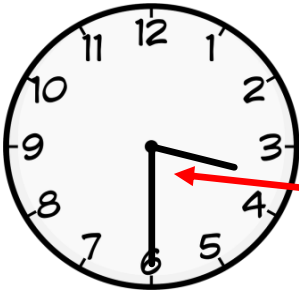
**Complete:** Angle e is **bigger/smaller** than angle f.  
**Explain.**

E  
X  
T  
E  
N  
D

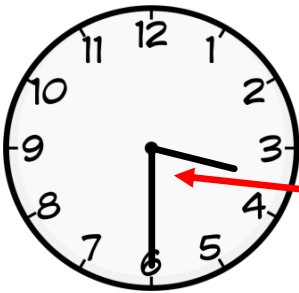
**Agree or disagree?**

*'The sum of the blue angles is the same as the red angle.'*

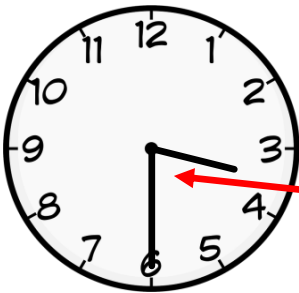
# Task 42 Question: Clock hands angles



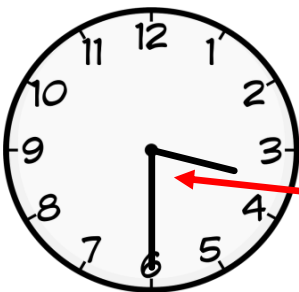
What is the angle between the hands of a clock at 3:30pm?



What is the angle between the hands of a clock at 3:30pm?



What is the angle between the hands of a clock at 3:30pm?

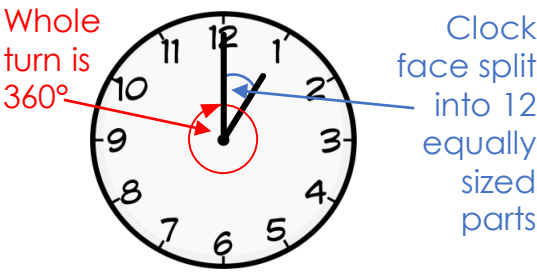


What is the angle between the hands of a clock at 3:30pm?

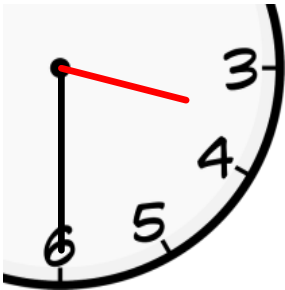
# Task 42 Prompts: Clock hands angles

S  
U  
P  
P  
O  
R  
T

**Tip 1:**  
Calculate the angle between each hour on a clock face

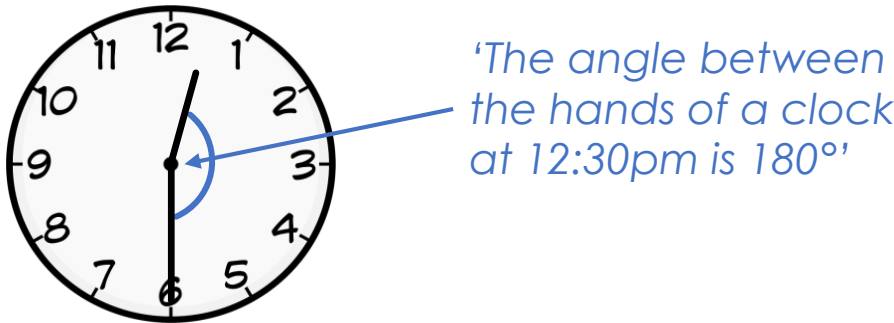


**Tip 2:**  
How far has the **hour hand** moved between 3 and 4?

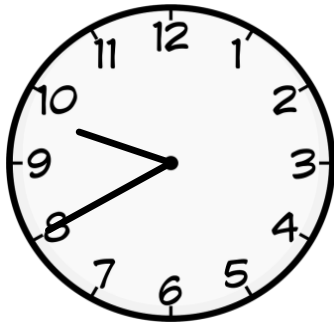


E  
X  
P  
L  
A  
I  
N

**Explain the mistake:**



E  
X  
T  
E  
N  
D



Calculate the angle between the hands on a clock face at 9:40am.  
**Explain how you worked it out.**

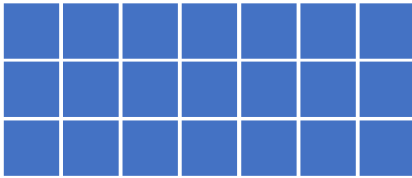
## Task 43 Question: Change the perimeter

For this task you will need some small squares.

**Make a rectangle with an area of 24 squares.**

**Make the perimeter as large as possible.**

Example:



Area of this shape = 21 squares

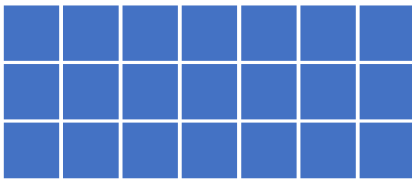
Perimeter of this shape = 20

For this task you will need some small squares.

**Make a rectangle with an area of 24 squares.**

**Make the perimeter as large as possible.**

Example:



Area of this shape = 21 squares

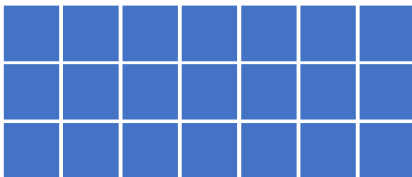
Perimeter of this shape = 20

For this task you will need some small squares.

**Make a rectangle with an area of 24 squares.**

**Make the perimeter as large as possible.**

Example:



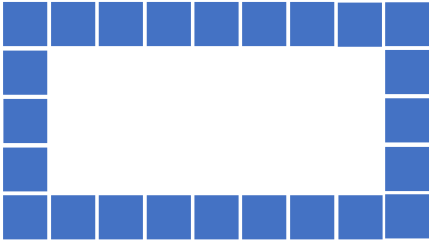
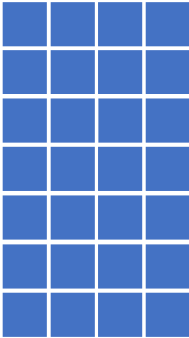
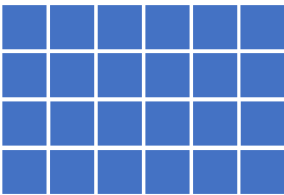
Area of this shape = 21 squares

Perimeter of this shape = 20

# Task 43 Prompts: Change the perimeter

SUPPORT

Which of these shapes have an area of 24 squares?

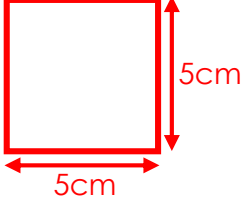




Explain the mistakes.


EXPLAIN

Order these shapes by area (smallest to largest). Then order the shapes by perimeter (smallest to largest).


**Shape A:**



**Shape B:**

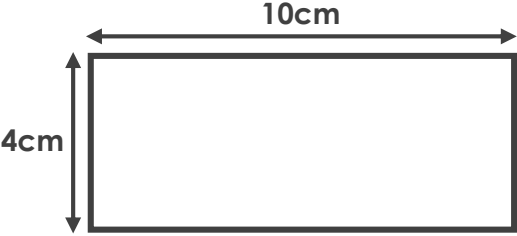


**Shape C:**



**What do you notice?**

EXTEND



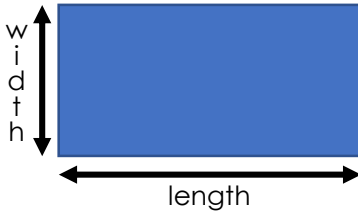
Draw a rectangle with a **larger area and a smaller perimeter** than this rectangle. Label the length and width of your rectangle.

## Task 44 Question: Rectangle length

The length of the rectangle is double its width.

The area of the rectangle, rounded to the nearest  $100\text{cm}^2$ , is  $200\text{cm}^2$ .

The length and width of the rectangle are whole numbers (in cm).



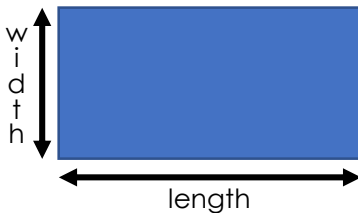
NOT TO  
SCALE

**What is the smallest that the length of rectangle can be?**

The length of the rectangle is double its width.

The area of the rectangle, rounded to the nearest  $100\text{cm}^2$ , is  $200\text{cm}^2$ .

The length and width of the rectangle are whole numbers (in cm).



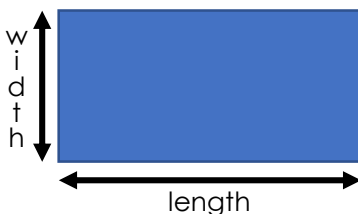
NOT TO  
SCALE

**What is the smallest that the length of rectangle can be?**

The length of the rectangle is double its width.

The area of the rectangle, rounded to the nearest  $100\text{cm}^2$ , is  $200\text{cm}^2$ .

The length and width of the rectangle are whole numbers (in cm).



NOT TO  
SCALE

**What is the smallest that the length of rectangle can be?**

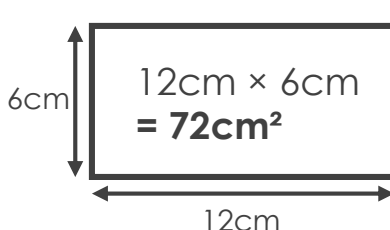


# Task 44 Prompts: Rectangle length

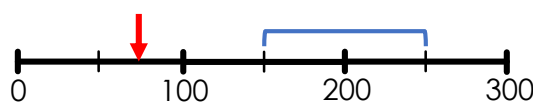
SUPPORT REPORT

**Example:**

12cm is double 6cm.



72cm<sup>2</sup> does not round to 200cm<sup>2</sup> so this example **does not** work.



EXPLAIN

**True or false?**     ✓ ✗

**Statement 1:** 'Doubling the length of the sides of a rectangle doubles the **perimeter** of the rectangle.'

**Statement 2:** 'Doubling the length of the sides of a square doubles the **area** of the square.'

EXTENSION

Draw a rectangle. Label the length and width.

Draw a new rectangle with half the length and double the width.

**Agree or disagree:**

*'The area of these two rectangles is the same.'*

Describe what you notice.

# Task 45 Question: Compound shape

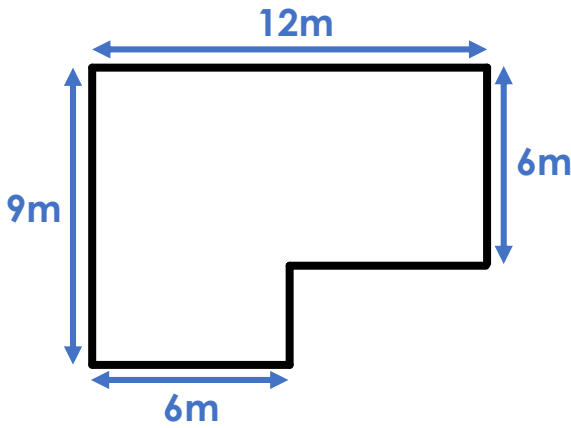


Diagram of a compound shape. The top horizontal side is 12m. The left vertical side is 9m. The bottom-left horizontal side is 6m. The right vertical side is 6m. The shape is a rectangle with a 6m wide section removed from the bottom right corner.

**What is the area of the shape?**

*Can you work it out in different ways?*

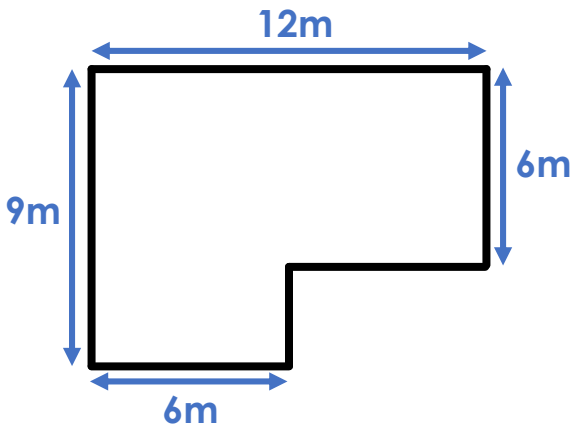


Diagram of a compound shape. The top horizontal side is 12m. The left vertical side is 9m. The bottom-left horizontal side is 6m. The right vertical side is 6m. The shape is a rectangle with a 6m wide section removed from the bottom right corner.

**What is the area of the shape?**

*Can you work it out in different ways?*

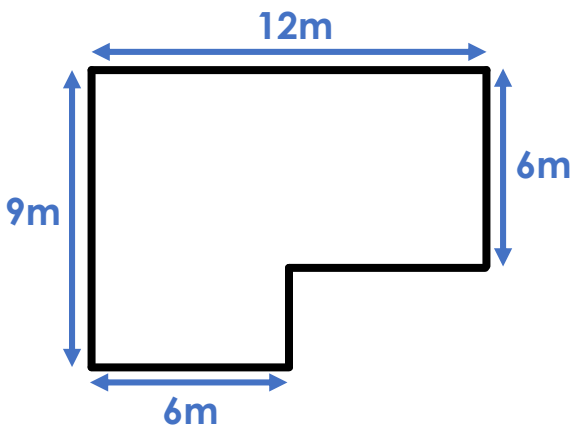


Diagram of a compound shape. The top horizontal side is 12m. The left vertical side is 9m. The bottom-left horizontal side is 6m. The right vertical side is 6m. The shape is a rectangle with a 6m wide section removed from the bottom right corner.

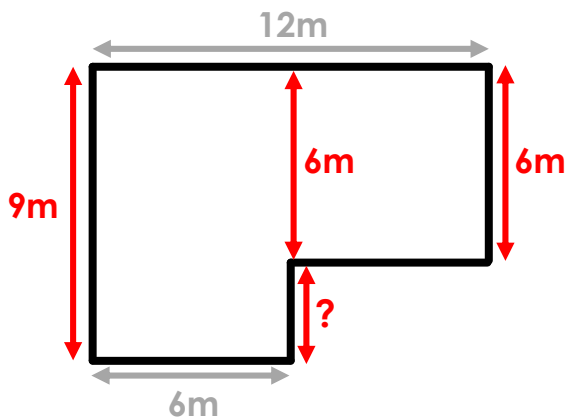
**What is the area of the shape?**

*Can you work it out in different ways?*

# Task 45 Prompts: Compound shape

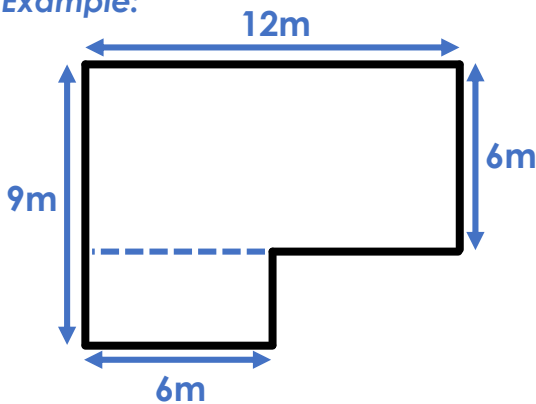
S  
U  
P  
P  
O  
R  
T

Calculate missing lengths:



Split shape into rectangles

Example:



E  
X  
P  
L  
A  
I  
N

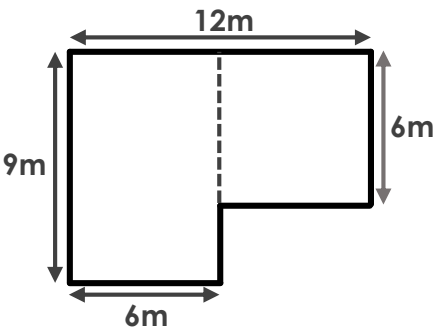
Explain the mistake:

$$9\text{m} \times 6\text{m} = 54\text{m}^2$$

$$12\text{m} \times 6\text{m} = 72\text{m}^2$$

$$54\text{m}^2 + 72\text{m}^2 = 126\text{m}^2$$

$$\text{Area} = \underline{126\text{m}^2}$$

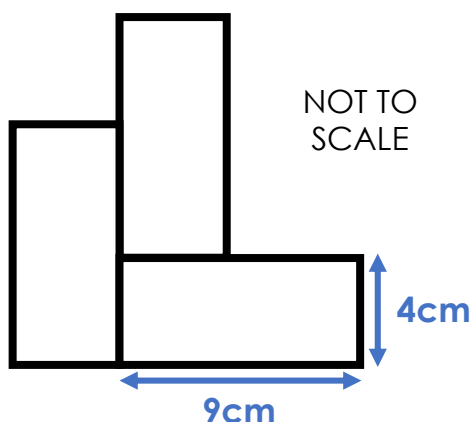


E  
X  
T  
E  
N  
D

Design a compound shape with an area of  $79\text{cm}^2$ .

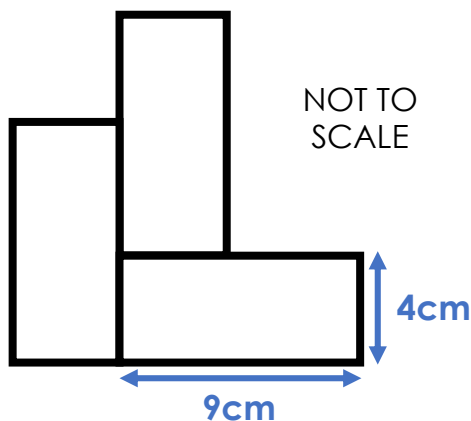
*Label the length of the sides.*

# Task 46 Question: Combined shapes



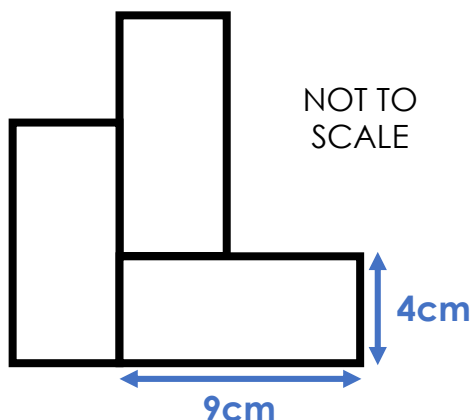
This shape is made using three identical rectangles. Each rectangle has a length of 9cm and a width of 4cm.

**What is the perimeter of the shape?**



This shape is made using three identical rectangles. Each rectangle has a length of 9cm and a width of 4cm.

**What is the perimeter of the shape?**



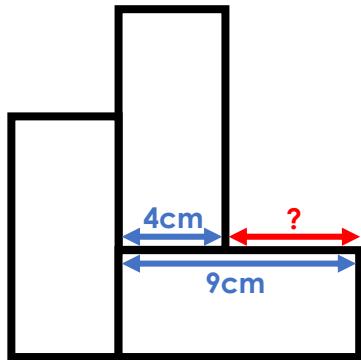
This shape is made using three identical rectangles. Each rectangle has a length of 9cm and a width of 4cm.

**What is the perimeter of the shape?**

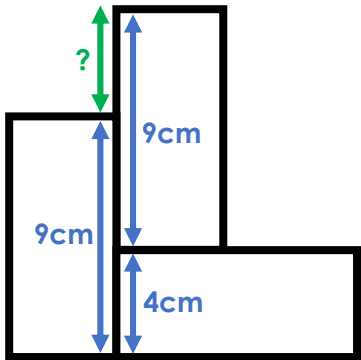
# Task 46 Prompts: Combined shapes

S  
U  
P  
P  
O  
R  
T

How long is the red line?

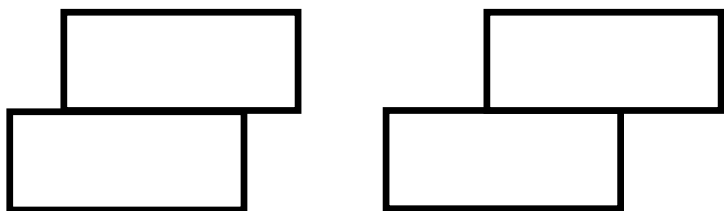


How long is the green line?



E  
X  
P  
L  
A  
I  
N

Agree or disagree?



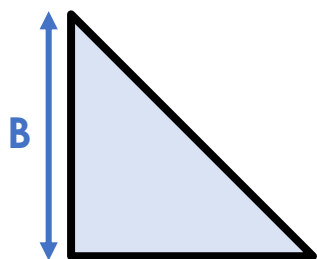
*'These shapes have different perimeters.'*

E  
X  
T  
E  
N  
D

**Challenge 1:** add one more identical rectangle to the start shape to make the perimeter as large as possible.

**Challenge 2:** add one more identical rectangle to the start shape. The perimeter of the shape must stay the same.

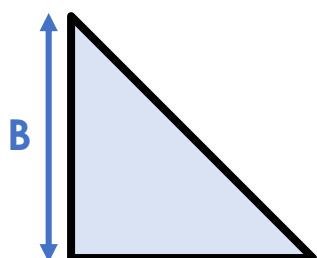
## Task 47 Question: Triangle area



The area of an isosceles right-angled triangle is **less than**  $150\text{cm}^2$ .

**What is the largest possible value for length B?**

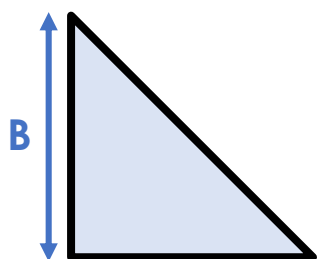
*Length B is a whole number.*



The area of an isosceles right-angled triangle is **less than**  $150\text{cm}^2$ .

**What is the largest possible value for length B?**

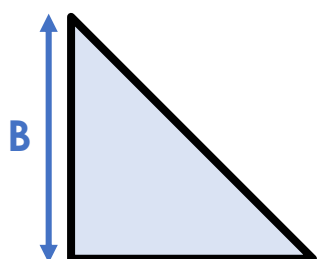
*Length B is a whole number.*



The area of an isosceles right-angled triangle is **less than**  $150\text{cm}^2$ .

**What is the largest possible value for length B?**

*Length B is a whole number.*



The area of an isosceles right-angled triangle is **less than**  $150\text{cm}^2$ .

**What is the largest possible value for length B?**

*Length B is a whole number.*

# Task 47 Prompts: Triangle area

SUPPORT

Area of this square:  
 $12\text{cm} \times 12\text{cm} = 144\text{cm}^2$

Area of this triangle:  
 $12\text{cm} \times 12\text{cm} \div 2 = 72\text{cm}^2$

EXPLAIN

Which shape is the odd one out?

Shape A:

Shape B:

Shape C:

**Challenge:** Think of a reason why **each shape** could be the odd one out.

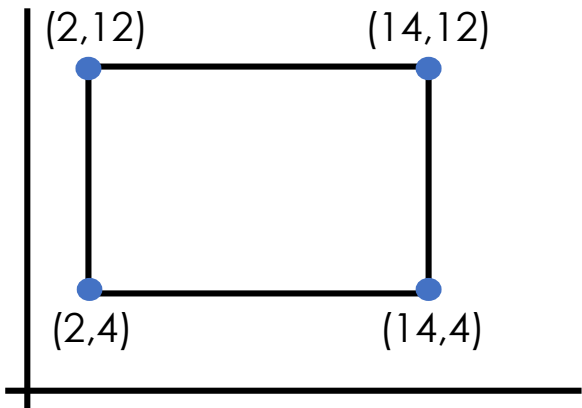
EXTEND

Rounded to the nearest  $100\text{cm}^2$ , the area of an isosceles right-angled triangle is  $300\text{cm}^2$ .  
 Length C is a whole number.

**Find all the possible values of length C.**

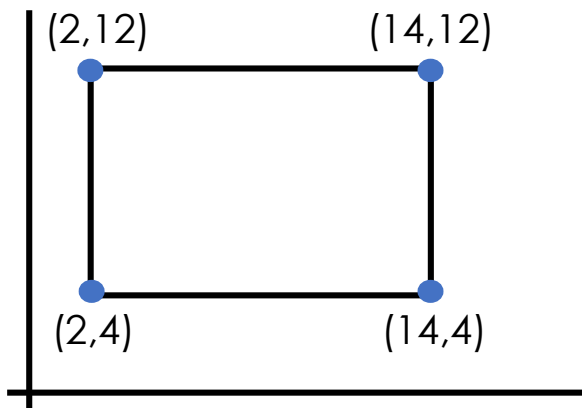
Ask your teacher if you are allowed a calculator for this question!

# Task 48 Question: Inside, edge or outside?



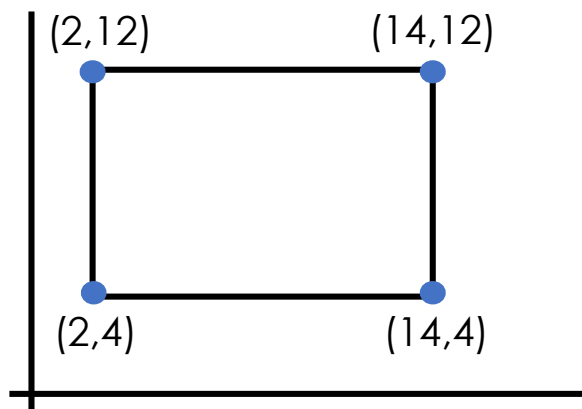
Are these coordinates on the inside, the edge or on the outside of the rectangle?

	Inside	Edge	Outside
(6,10)	✓		
(9,14)			
(14,9)			
(13,5)			



Are these coordinates on the inside, the edge or on the outside of the rectangle?

	Inside	Edge	Outside
(6,10)	✓		
(9,14)			
(14,9)			
(13,5)			



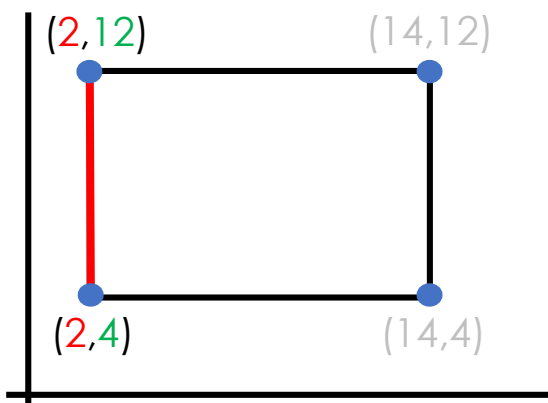
Are these coordinates on the inside, the edge or on the outside of the rectangle?

	Inside	Edge	Outside
(6,10)	✓		
(9,14)			
(14,9)			
(13,5)			



# Task 48 Prompts: Inside, edge or outside?

S  
U  
P  
P  
O  
R  
T



## Example:

Every coordinate on the red line has an **x coordinate of 2**.

Every coordinate on the red line has a **y coordinate between 4 and 12**.

**(2, 7) and (2, 10) are on the red line.**

**(3, 7) and (2, 13) are not on the red line.**

E  
X  
P  
L  
A  
I  
N

## Agree or disagree:

'To work out the length of the left edge of the rectangle do  $12 - 4$ . It is 8.'

'To work out the length of the bottom side of the rectangle do  $14 - 4$ . It is 10.'

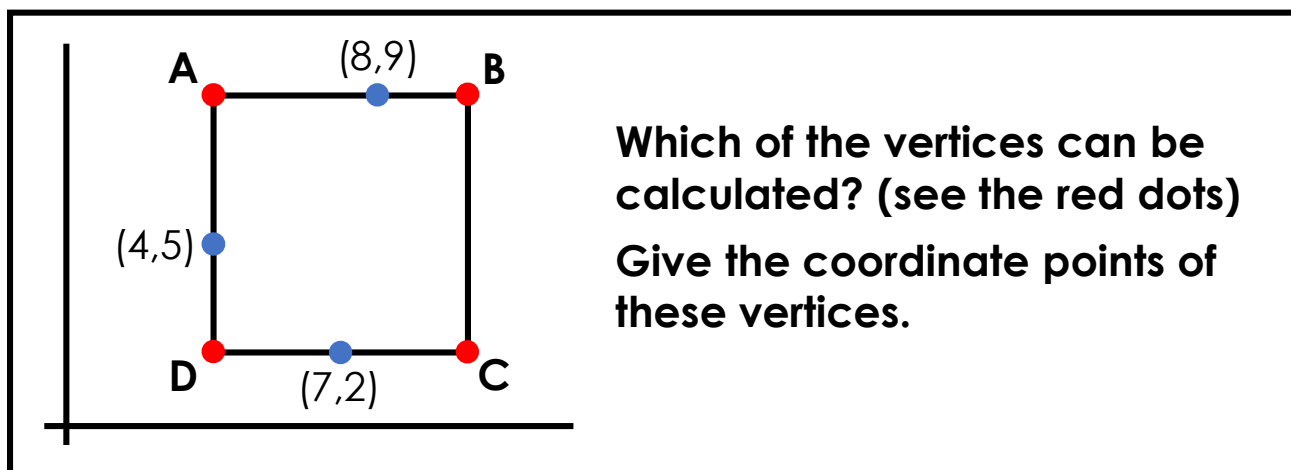
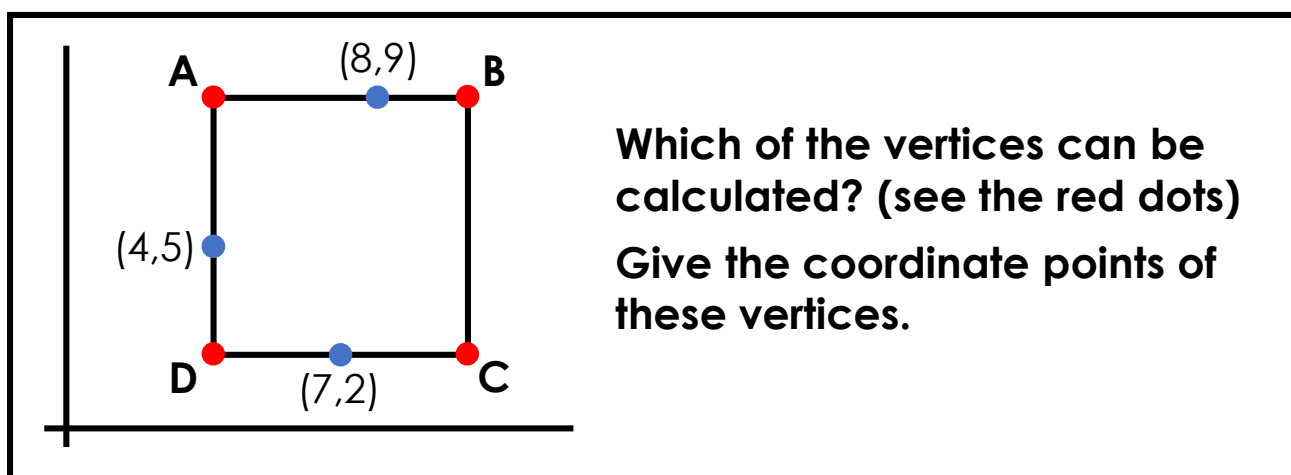
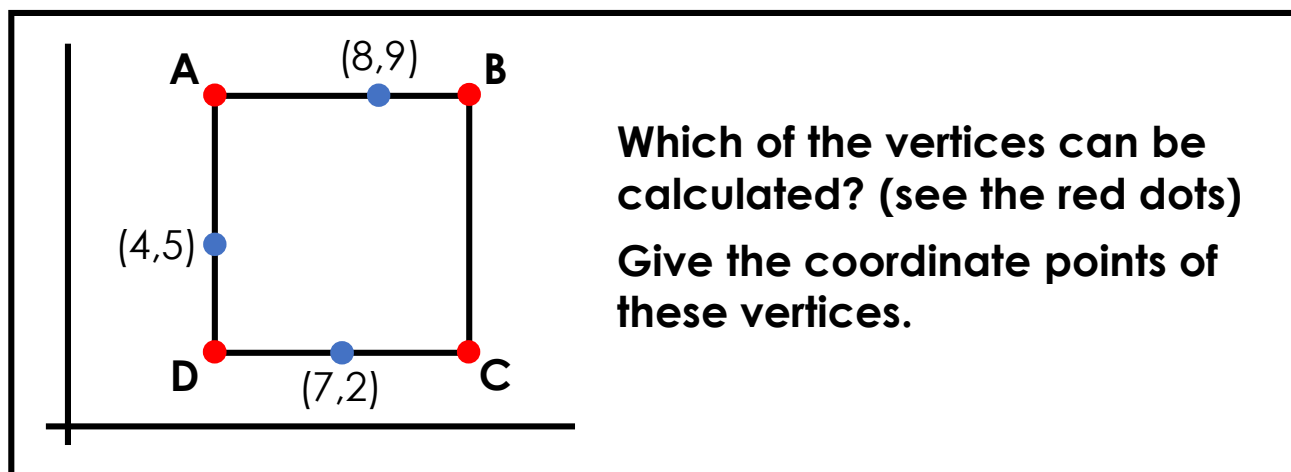
E  
X  
T  
E  
N  
D

For the main task you were given **all four** coordinate points for the vertices of the rectangle.

'We actually only needed to be given **two** of the coordinate points to answer the question.'

**Explain why this statement is correct.**

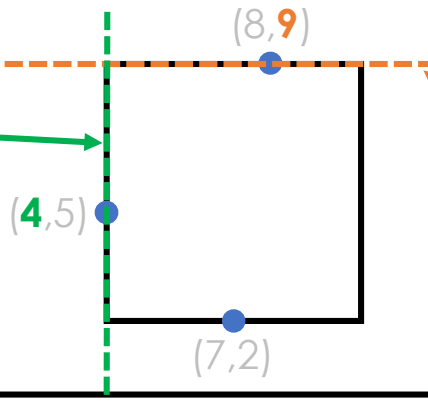
# Task 49 Question: Which vertices?



# Task 49 Prompts: Which vertices?

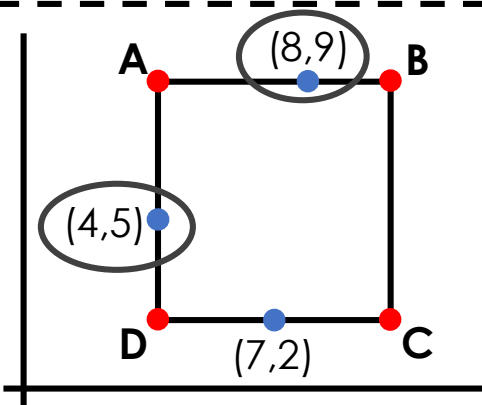
S  
U  
P  
P  
O  
R  
T

Every point on the green line has an x coordinate of 4.



Every point on the orange line has a y coordinate of 9.

E  
X  
P  
L  
A  
I  
N



**Explain the mistake:**

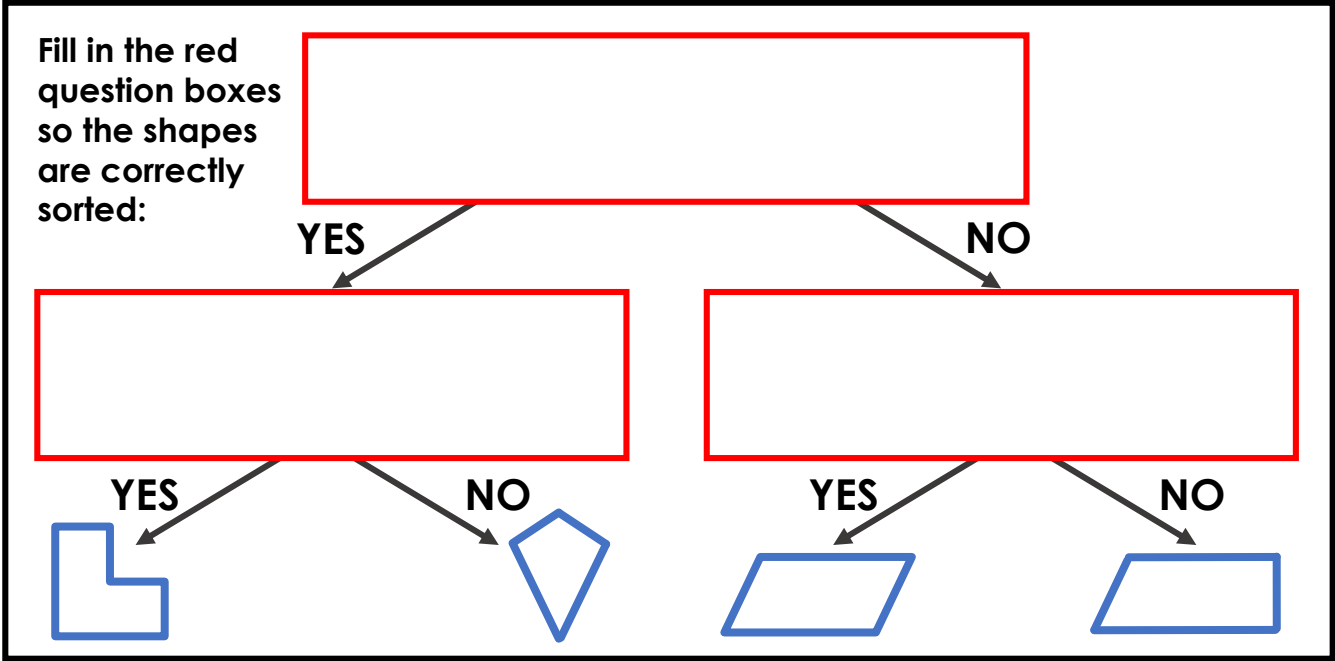
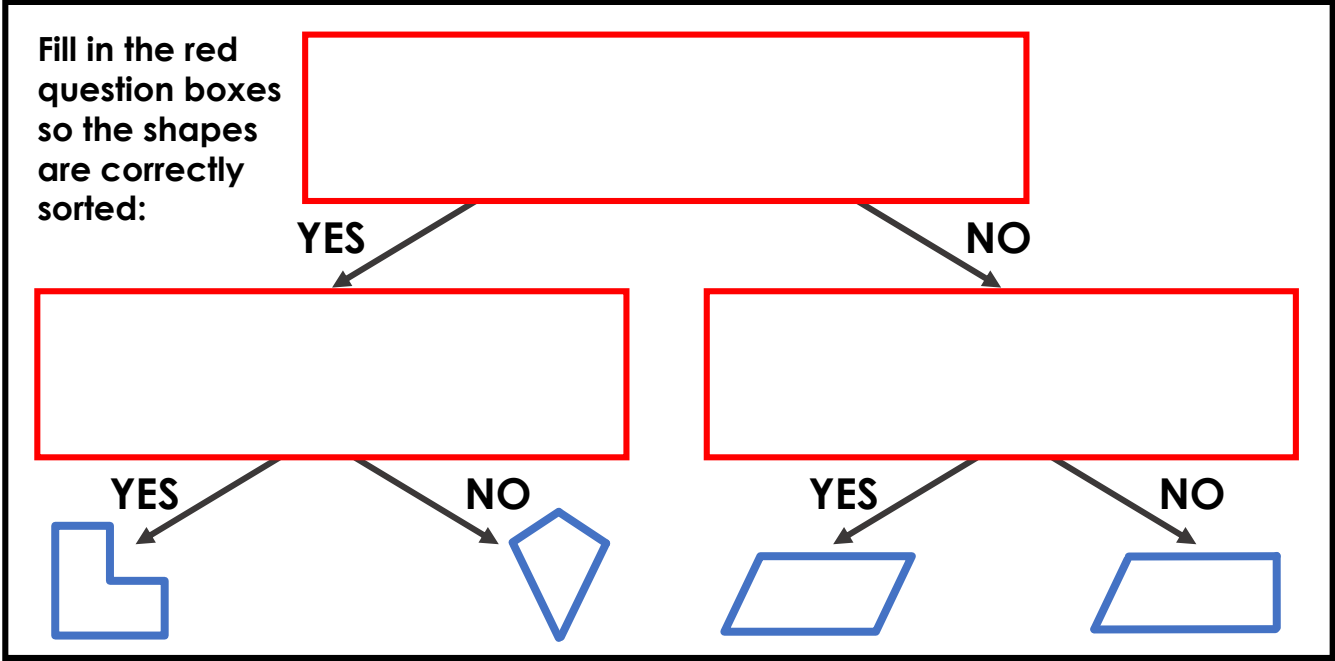
'I have circled the two coordinates needed to work out point A. The coordinates of point A are  $(5,9)$ .'

E  
X  
T  
E  
N  
D

If you were given one more coordinate point, you could work out the coordinates of all four vertices.

**Where would this coordinate point have to be?**

# Task 50 Question: Branching database





# Task 50 Prompts: Branching database

SUPPORT

**Examples** The questions in the red boxes sort these shapes correctly:



Does the shape have a right-angle?

YES
NO

Does the shape have a line of symmetry?



YES
NO



EXPLAIN

**For each pair of shapes, what is the same and what it different?**



Pair of shapes A:

Pair of shapes B:








Pair of shapes C:

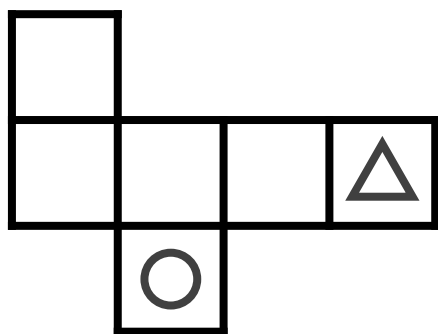
EXTEND

Think of a reason why **each shape** could be the **odd one out**:

SHAPE
I SEE PROBLEM-SOLVING – UKS2

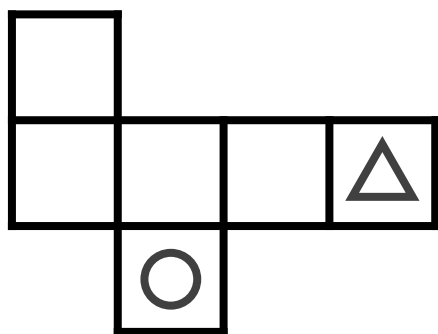
# Task 51 Question: Cube nets



**Complete the cube net so...**

There are 2 squares, 2 circles and 2 triangles drawn on the net (draw one shape in each face).

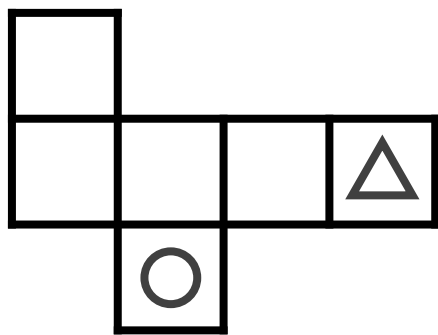
When the net is made into a cube, the shapes on the opposite faces will match.



**Complete the cube net so...**

There are 2 squares, 2 circles and 2 triangles drawn on the net (draw one shape in each face).

When the net is made into a cube, the shapes on the opposite faces will match.



**Complete the cube net so...**

There are 2 squares, 2 circles and 2 triangles drawn on the net (draw one shape in each face).

When the net is made into a cube, the shapes on the opposite faces will match.

# Task 51 Prompts: Cube nets

**SUPPORT**

**Tip 1:** Remember that connecting faces don't touch. For example, the second triangle is **not** on this face.

**Tip 2:** Imagine this face staying still and the other faces being folded around it.

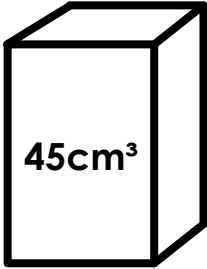
**EXPLAIN**

Explain why each of these shape is **not** the net of a cube:

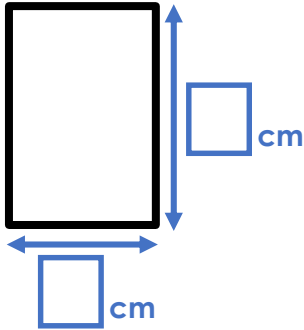
**EXTEND**

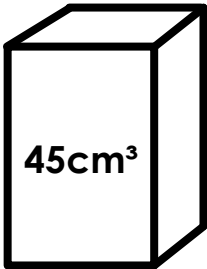
Draw a sixth square on each shape to complete the net of a cube.  
**Do in four different ways.**

# Task 52 Question: Cuboid dimensions

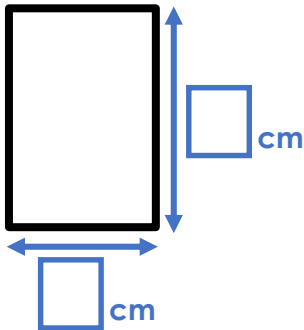


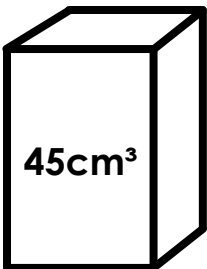
This cuboid is made with two squares and four rectangles.  
 The volume of the cuboid is  $45\text{cm}^3$ .  
 The length of each edge, measured in cm, is a whole number.  
**Label the length and width of the rectangular faces of the cuboid.**



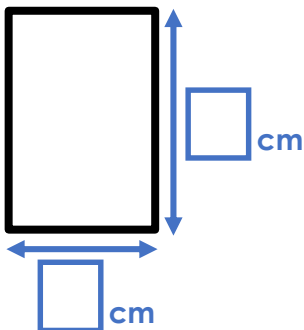


This cuboid is made with two squares and four rectangles.  
 The volume of the cuboid is  $45\text{cm}^3$ .  
 The length of each edge, measured in cm, is a whole number.  
**Label the length and width of the rectangular faces of the cuboid.**





This cuboid is made with two squares and four rectangles.  
 The volume of the cuboid is  $45\text{cm}^3$ .  
 The length of each edge, measured in cm, is a whole number.  
**Label the length and width of the rectangular faces of the cuboid.**

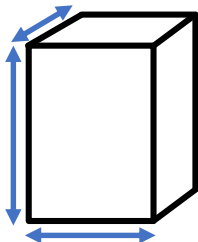




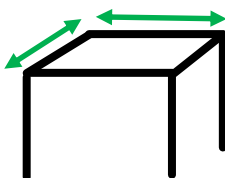
# Task 52 Prompts: Cuboid dimensions

S  
U  
P  
P  
O  
R  
T

**Tip 1:** volume of cuboid  
= length × width × height



**Tip 2:** the lengths of the  
edges on the square  
face are the same



**Tip 3:** the square's sides  
can **not** be 4cm.

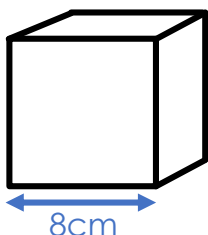
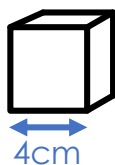
$$4\text{cm} \times 4\text{cm} \times \boxed{\phantom{00}}\text{cm} = 45\text{cm}^2$$

4 is not a factors of 45.

*What could be the length of  
the sides of the square?*

E  
X  
P  
L  
A  
I  
N

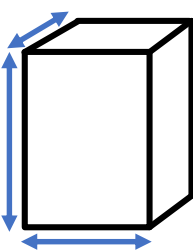
Here are two cubes.



**How many of the smaller cubes  
fit into the larger cube?**

- (a) 2
- (b) 4
- (c) 8

E  
X  
T  
E  
N  
D

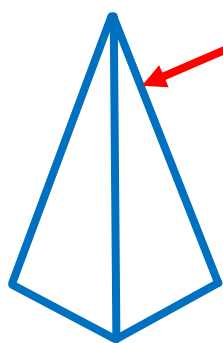


**To double the volume of a cuboid...**

- (a) Double the length of one side
- (b) Double the length of two of the sides
- (c) Double the length of all of the sides

**Explain.**

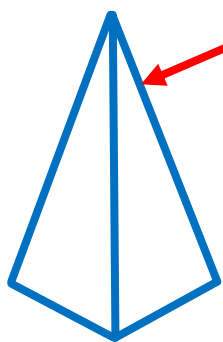
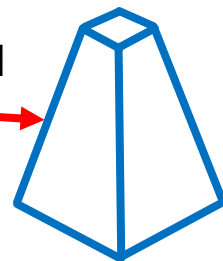
# Task 53 Question: Faces, edges, vertices



This is a square-based pyramid.

The top of the square-based pyramid is cut off. This new shape is made.

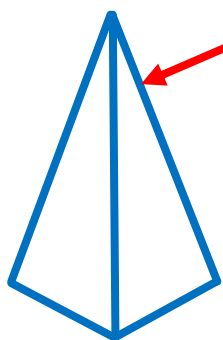
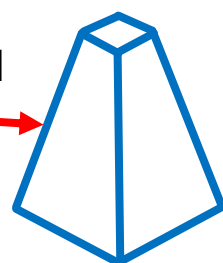
**How many more faces, edges and vertices does the new shape have than the square-based pyramid?**



This is a square-based pyramid.

The top of the square-based pyramid is cut off. This new shape is made.

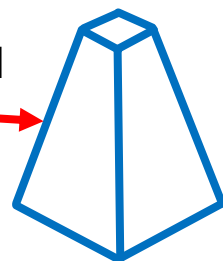
**How many more faces, edges and vertices does the new shape have than the square-based pyramid?**



This is a square-based pyramid.

The top of the square-based pyramid is cut off. This new shape is made.

**How many more faces, edges and vertices does the new shape have than the square-based pyramid?**



# Task 53 Prompts: Faces, edges, vertices

S  
U  
P  
P  
O  
R  
T

**Reminder:**

edges

faces

vertices

How is this shape the same as the square-based pyramid?

How is this shape different to the square-based pyramid?

E  
X  
P  
L  
A  
I  
N

**Always, sometimes or never?**

'If you cut either the top or the bottom off a prism, the number of faces, edges and vertices stays the same.'

'If you cut either the top or the bottom off a pyramid, the number of faces, edges and vertices increases.'

E  
X  
T  
E  
N  
D

**2D faces:**

1 square and \_\_\_ triangles

**2D faces:**

*Your example*

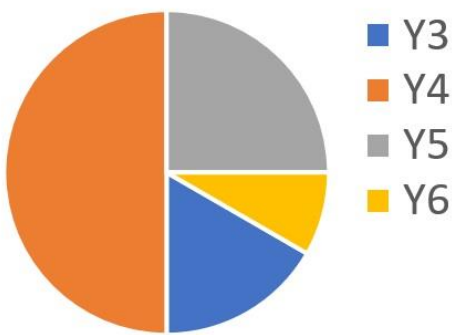
**Shape:**

**2D faces:**

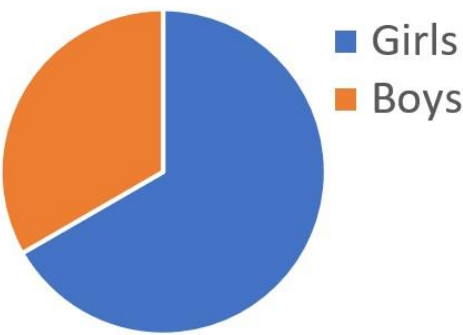
# Task 54 Question: Before/now pie charts

At the start of term, there were 12 children in running club. These graphs tell you about the children at running club:

Year Group of Children  
at Running Club

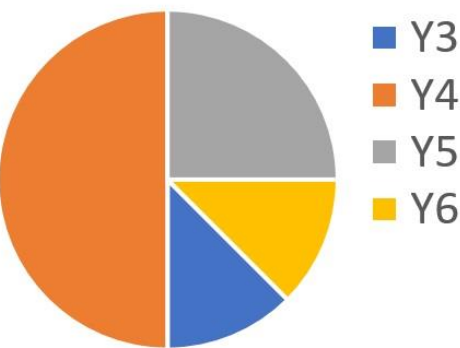


Gender of Children  
at Running Club

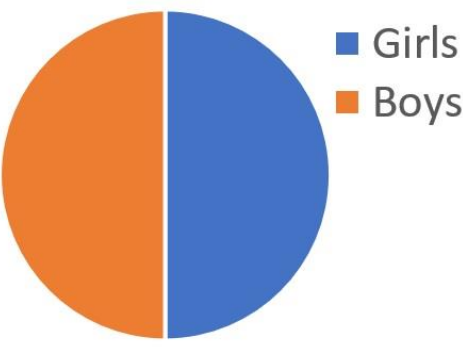


This term, 4 children joined running club. Nobody left. These graphs tell you about the children at running club now:

Year Group of Children  
at Running Club



Gender of Children  
at Running Club



*What do you know about the 4 children who joined running club?*

# Task 54 Prompts: Before/now pie charts

S  
U  
P  
P  
O  
R  
T

**Running club, start of term:**

\_\_\_ boys

\_\_\_ girls

**Running club, end of term:**

8 boys

8 girls

**Running club, start of term:**

2 children in Y3

6 children in Y4

3 children in Y5

1 child in Y6

**Running club, end of term:**

\_\_\_ children in Y3

\_\_\_ children in Y4

\_\_\_ children in Y5

\_\_\_ children in Y6

E  
X  
P  
L  
A  
I  
N

**Agree or disagree:**

'Most of the children who joined running club were boys.'

'All of the children who joined running club were boys.'

'None of the children who joined running club were in Y4.'

E  
X  
T  
E  
N  
D

A few weeks later, a group of year 5 children joined running club. This meant that half the children at running club were from year 5.

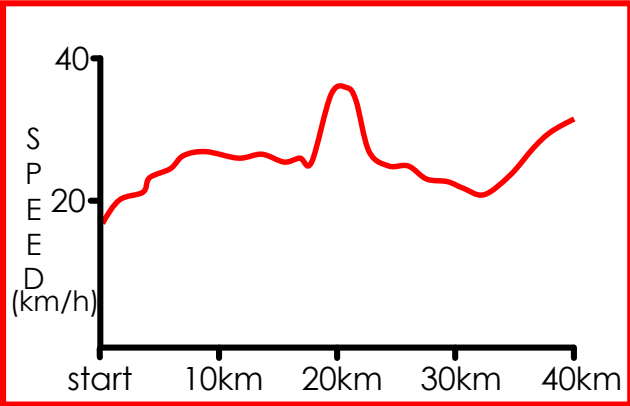
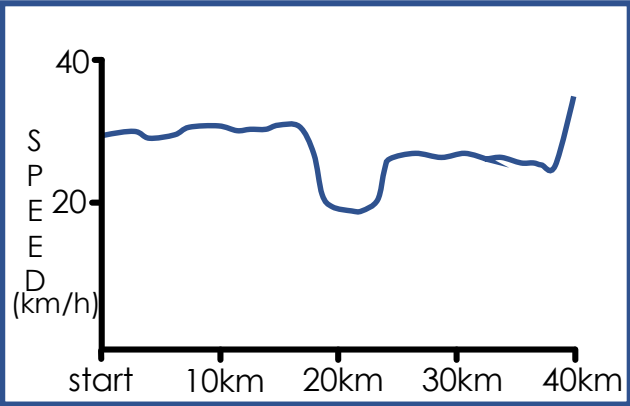
**How many year 5 children joined running club?**

# Task 55 Question: Bike race line graphs

**Jen took part in a 40km bike ride. Here, she describes her race:**

*'I started the race quickly. There was a big uphill climb half-way through the race. I slowed down for the last 5km but I did a sprint finish.'*

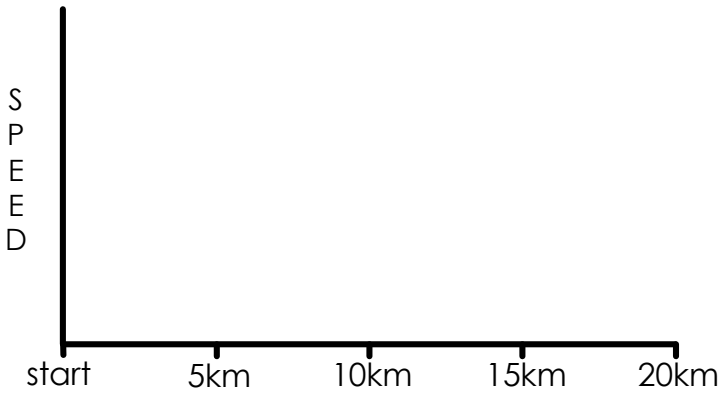
**Which graph shows Jen's performance in the race?**



**Jamie took part in a 20km bike race. He describes his ride:**

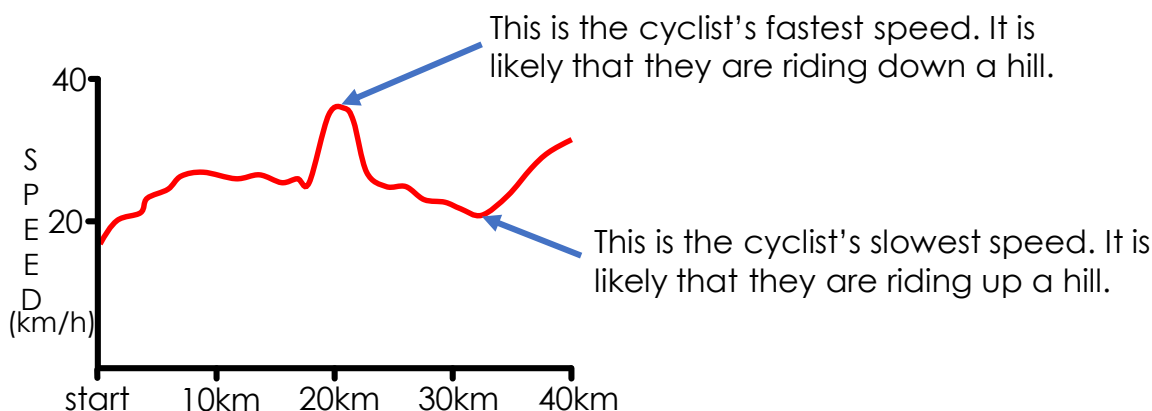
*'I started quickly - first 3km of the race was downhill. I slowed down after that, cycling at a similar speed in the middle part of the race. There was a long hill that started 15km into the race. The fastest part of my race was the last 2km.'*

**Complete the graph of Jamie's performance in the race:**



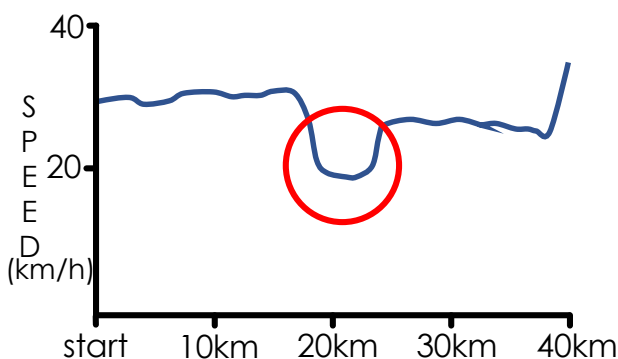
# Task 55 Prompts: Bike race line graphs

S  
U  
P  
P  
O  
R  
T



E  
X  
P  
L  
A  
I  
N

Look at the circled section of the line graph.



**Agree or disagree:**

'Here, the rider is going downhill'

'The rider slows down here. They might be riding uphill.'

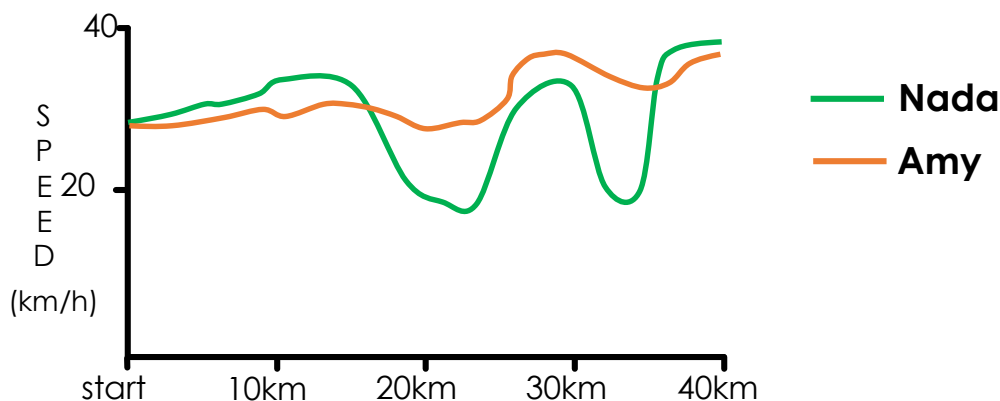
'The rider stops for a rest here.'

E  
X  
T  
E  
N  
D

This graph shows the speeds of Nada and Amy in the race.

**Describe the difference between their races.**

**Which cyclist do you think finished first - Nada or Amy?**



# Task 56 Question: Train timetables

Here is a train timetable for the morning trains from Sheffield to Newcastle:

<b>Sheffield</b>	6:20	7:04	7:58	8:45
<b>Doncaster</b>	6:47	7:33	8:25	9:14
<b>York</b>	7:14	8:00	8:52	9:41
<b>Darlington</b>	7:43	8:29	9:21	10:11
<b>Durham</b>	8:01	8:48	9:39	10:30
<b>Newcastle</b>	8:14	9:01	9:52	10:43

Stan is travelling from Doncaster to Durham.  
He gets to Doncaster train station at 7:35am.

**When will he arrive in Durham?**

Here is a train timetable for the morning trains from Sheffield to Newcastle:

<b>Sheffield</b>	6:20	7:04	7:58	8:45
<b>Doncaster</b>	6:47	7:33	8:25	9:14
<b>York</b>	7:14	8:00	8:52	9:41
<b>Darlington</b>	7:43	8:29	9:21	10:11
<b>Durham</b>	8:01	8:48	9:39	10:30
<b>Newcastle</b>	8:14	9:01	9:52	10:43

Stan is travelling from Doncaster to Durham.  
He gets to Doncaster train station at 7:35am.

**When will he arrive in Durham?**

Here is a train timetable for the morning trains from Sheffield to Newcastle:

<b>Sheffield</b>	6:20	7:04	7:58	8:45
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<b>Darlington</b>	7:43	8:29	9:21	10:11
<b>Durham</b>	8:01	8:48	9:39	10:30
<b>Newcastle</b>	8:14	9:01	9:52	10:43

Stan is travelling from Doncaster to Durham.  
He gets to Doncaster train station at 7:35am.

**When will he arrive in Durham?**



# Task 56 Prompts: Train timetables

S  
U  
P  
P  
O  
R  
T

Using train timetables:

Sheffield	6:20	7:04	7:58	8:45
Doncaster	6:47	7:33	8:25	9:14
York	7:14	8:00	8:52	9:41
Darlington	7:43	8:29	9:21	10:11
Durham	8:01	8:48	9:39	10:30
Newcastle	8:14	9:01	9:52	10:43

Rows show the times that trains leave each train station.

This row shows the times that trains are leaving Doncaster train station.

**Start by working out the time at which Stan's train left Doncaster.**

Columns show the journey of each train. This is the first train. We can see the time it leaves each train station.

E  
X  
P  
L  
A  
I  
N

**Explain the mistake:**

'The first train sets off at 6:20 from Sheffield and arrives at 8:45.'

'If I arrive at York train station at quarter past seven I can catch the first train.'

E  
X  
T  
E  
N  
D

Jen lives in York. She has a job interview a 10-minute walk from Newcastle train station. Her interview starts at 9:15am.

**At what time should Jen arrive at York train station?**

Explain your choice.

## Task 57 Question: Average of 3 numbers

Three positive whole-numbers have an average of 6.  
The difference between the largest and the smallest of these numbers is 5.

**What are the three numbers?**

*There are two possible answers.*

Three positive whole-numbers have an average of 6.  
The difference between the largest and the smallest of these numbers is 5.

**What are the three numbers?**

*There are two possible answers.*

Three positive whole-numbers have an average of 6.  
The difference between the largest and the smallest of these numbers is 5.

**What are the three numbers?**

*There are two possible answers.*

Three positive whole-numbers have an average of 6.  
The difference between the largest and the smallest of these numbers is 5.

**What are the three numbers?**

*There are two possible answers.*

# Task 57 Prompts: Average of 3 numbers

S  
U  
P  
P  
O  
R  
T

**Example:**

6	6	6
---	---	---

← Three 6s

4	6	8
---	---	---

← These three numbers have an average of 6

The difference between the largest and smallest of these numbers is 4 (the difference between 8 and 4 is 4).

E  
X  
P  
L  
A  
I  
N

**Explain the mistakes:**

**Example 1:**

9, 7, 4, 4

**Example 2:**

4, 6, 9

**Example 3:**

8, 6, 4

E  
X  
T  
E  
N  
D

The average of four positive whole-numbers is 8.

The difference between the largest and the smallest of these numbers is 5.

**What could the four numbers be?**

*Find all possible answers.*

## Task 58 Question: Average ages

There were three children in the room, with an average age of 7.

Then, Harry walked into the room. Now the average age of the people in the room is 9.

**How old is Harry?**

There were three children in the room, with an average age of 7.

Then, Harry walked into the room. Now the average age of the people in the room is 9.

**How old is Harry?**

There were three children in the room, with an average age of 7.

Then, Harry walked into the room. Now the average age of the people in the room is 9.

**How old is Harry?**

There were three children in the room, with an average age of 7.

Then, Harry walked into the room. Now the average age of the people in the room is 9.

**How old is Harry?**

# Task 58 Prompts: Average ages

S  
U  
P  
P  
O  
R  
T

Three children with an average age of 7:

7	7	7

21

We don't know the ages of the three children.

Four children with an average age of 9:

9	9	9	9

21

Harry's age

E  
X  
P  
L  
A  
I  
N

**Possible or impossible?**

'The average age of three children is 8. None of the children are 8 years-old.'

'The average age of three brothers is 9. One of the brothers is 21 years old.'

E  
X  
T  
E  
N  
D

Sophie and Anna are twins. Their younger sister is called Jenna.

The twins are 6 years older than Jenna. The average age of the three children is 9.

**How old is Jenna?**

# I SEE PROBLEM-SOLVING – UKS2

## Answers

There are worked examples for each of the main questions. They can be downloaded for free at [www.iseemaths.com/problem-solving-uks2](http://www.iseemaths.com/problem-solving-uks2)

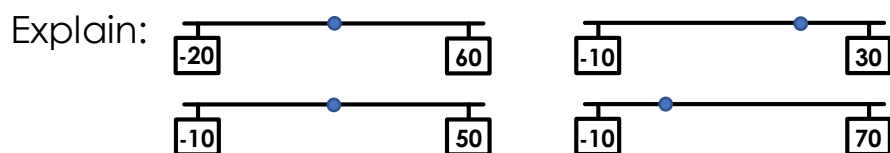
**Task 1: Sum of the digits:** Smallest number = 15, largest number = 3210  
Extend: smallest number = 29, largest number = 53210

**Task 2: Decimal number line:** Example answer 1: 0.18, 0.19, 0.2  
Example answer 2: 0.09, 0.19, 0.29  
Extend: line 1 = 0.015    number line 2 = 0.11    number line 3 = 0.01

**Task 3: Rounding money:** Greatest difference: £449 - £245 = £204  
Explain: £449  
Extend: Alex could have £252, £253 or £254

**Task 4: Rounding puzzles:** Part 1 = 4049, part 2 = 4099  
Explain: box 1 = 100, box 2 = 10 (other numbers possible also)  
Extend: (a) 2700    (b) 2600    (c) 2650    (d) 3000

**Task 5: Negatives on a number line:** Example answer 1: -5 and 100  
Example answer 2: -20 and 130



Extend: Example answers: -5 & 35    -20 & 40

**Task 6: Number sequences:** Example answers: 9, 5, 1    13, 8, 3    17, 11, 5  
Explain: first two sequences will include 0

Extend: Sequences go down in steps of 4 or 5 e.g. 54, 49, 44    53, 49, 45

**Task 7: More, less, equal:** Answer 1:  $10 - 8 < 8 - 5$      $20 > 6 \times 3$      $7 + 4 = 15 - 4$   
Answer 2:  $10 - 8 < 8 - 5$      $20 > 6 \times 3$      $4 + 4 = 15 - 7$

Explain: Mistake 1: top equation. Mistake 2: 6 is used twice.

Extend:  $8 \times \underline{\quad} = 30 - \underline{\quad}$  there are 3 ways (1 & 22, 2 & 14, 3 & 6)

$53 - \underline{\quad} = 48 + \underline{\quad}$  there are 4 ways (1 & 4, 2 & 3, 3 & 2, 4 & 1)

$60 \div \underline{\quad} = 10 + \underline{\quad}$  there are 5 ways (1 & 50, 2 & 20, 3 & 10, 4 & 5, 5 & 2)

$28 \div \underline{\quad} = \underline{\quad} \times 2$  there are 4 ways (1 & 14, 2 & 7, 7 & 2, 14 & 1)

# I SEE PROBLEM-SOLVING – UKS2

## Answers

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**Task 8: Four number sentences:**  $8 \times 3 = 18 + 6$      $2 < 9 - 3$      $7 \div 2 < 4$   
 $2 \times 2 \times 2 \times 2 < 9 + 8$

Explain: Mo **is** correct (all possible answers **will** be less than 8), although more precise to say numbers must be less than 7. Dan is incorrect because the number in the red box could be 6.

Extend: Set A can be used: numbers can be positioned in the same places as the main question, with the 5 replacing the 3.

Set B can't be used as there isn't a position for the 8.

Set C can be used:  $9 \times 3 = 18 + 9$      $2 < 9 - 6$      $6 \div 2 < 4$   
 $2 \times 2 \times 2 \times 2 < 9 + 8$

**Task 9: Subtraction number sentences:** 42, 48, 54.

Explain: True number sentences:  $25 - 60 < 35$      $80 - 42 < 39$

Extend:    H – **25** < 35    make the number in bold in the range 38→44  
               H – 25 < **35**    make the number in bold in the range 48→54  
               **80** – H < 39    make the number in bold in the range 62→68  
               80 – H < **39**    make the number in bold in the range 51→59  
               Change the last line to 'H is a multiple of 3'

**Task 10: Missing digits addition:**  $687 + 365 = 1052$

Explain: Example 1 one way ( $162 + 183 = 345$ )

Example 2 four ways ( $347 + 239 = 586$ ,  $247 + 339 = 586$ ,  $147 + 439 = 586$ ,  $447 + 139 = 586$ )

Example 3 one way ( $650 + 498 = 1148$ )

**Task 11: Missing digits subtraction:**  $682 - 439 = 243$

Explain: Example A:  $337 - 154 = 183$  (involves regrouping)

Example B:  $889 - 652 = 237$  (no regrouping)

Extend: Example answer:  $1098 - 675 = 423$  (note that the digit 1 has to go in the thousands position)

# I SEE PROBLEM-SOLVING – UKS2

## Answers

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**Task 12: Sum and difference:** 6.5 and 2.5

Explain: 9 & 5    11 & 3

Extend: Statement 1 is true: the sum of two whole numbers with a difference of 3 is always odd.

Statement 2 is true if one of the numbers is zero, e.g. 0 and 4 have a sum of 4 and a difference of 4.

**Task 13: Four numbers challenge:** 3 sets of possible answers: 2, 6, 7, 8  
3, 5, 6, 9    3, 4, 7, 9

Explain: If the largest number was 7 then the smallest number would have to be 1 for there to be a difference of 6 between the largest and smallest numbers. The other two numbers would have to add up to 15 ( $7 + 1 + 15 = 23$ ). It is not possible for two numbers to add up to 15 without one of the numbers being larger than 7.

Extend: 4 5.5 7.5 8    4 6 7 8    4.5 5 7 8.5    4.5 5.5 6.5 8.5

**Task 14: The café:** Biscuit = 35p.

Explain: The difference between the cost of the tea and the biscuit was not subtracted from £1.30 before it was halved. Based on these calculations, the total cost would be £1.70 rather than £1.30.

Extend: Coffee = £1.35 (apple = 45p)

**Task 15: Multiplication missing digits:**  $68 \times 43$

Extend:  $46 \times 87$

**Task 16: Remainder of one-half:**  $60 \div 8 = 7\frac{1}{2}$      $36 \div 8 = 4\frac{1}{2}$      $76 \div 8 = 9\frac{1}{2}$

Explain: Disagree: blue box = 36, red box = 34

Extend: 5 ways:  $26 \div 8 = 3\frac{1}{4}$      $50 \div 8 = 6\frac{1}{4}$      $60 \div 8 = 7\frac{2}{4}$      $76 \div 8 = 9\frac{2}{4}$   
 $62 \div 8 = 7\frac{3}{4}$

**Task 17: Find the factors:** 1, 2, 4, 7

Explain: Disagree: half the multiples of 4 are not multiples of 8

Extend: 96, 72, 48, 36, 32, 24, 18, 16, 12



# I SEE PROBLEM-SOLVING – UKS2

## Answers

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### Task 18: Number detective: 76

Explain: Change the digits used (e.g. 64 becomes 73); change the position of the digits (e.g. 64 becomes 46); change the number of digits (e.g. 64 becomes 640)

Extend: 102, 120, 201, 210, 111

### Task 19: Athletics club ratios: 24 children

Explain: Answer 1 is correct. Divide 36 by **4** for a ratio of 3:1

Extend: Q1: 36 boys      Q2: 150 children      Q3: 135 girls

### Task 20: Shot accuracy statistics: 192 shots

Explain: Julia and Zoe score with  $\frac{3}{4}$  of their shots. Joy is the odd one out.

Extend: Zaynah scored 16 times in the first half with a scored:missed ratio of 4:1, so she scored 12 more shots than she missed. This difference between shots scored and shots missed stays the same in the second half. To finish the game with a scoring ratio of 2:1 she scores with 24 shots and misses with 12. In total this is **36 shots**.

### Task 21: Pages read, pages left: 60 pages

Explain: Mistake 1: 90 is not the whole number of pages in the book.

Mistake 2: the question asks how many pages have been read.

Extend: 24 is 60% of 40      12 is 40% of 30      56 is 80% of 70

### Task 22: Clothes shop sales: 25% discount

Explain: To calculate the % discount work out the percentage discount from the **start price**, not the sale price.

Extend: £64

### Task 23: Fraction of square: $\frac{3}{8}$

Explain: The parts are the same size but the whole has changed so the fractions made are incorrect.

Extend:  $\frac{3}{8}$        $\frac{3}{16}$

# I SEE PROBLEM-SOLVING – UKS2

## Answers

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**Task 24: Adding fractions:**  $\frac{1}{6} + \frac{1}{6} = \frac{1}{3}$      $\frac{1}{6} + \frac{1}{2} = \frac{2}{3}$      $\frac{2}{6} + \frac{1}{3} = \frac{2}{3}$      $\frac{3}{6} + \frac{1}{6} = \frac{2}{3}$

Explain:  $\frac{1}{12}$  can not be used.  $\frac{1}{3} = \frac{4}{12}$  and  $\frac{2}{3} = \frac{8}{12}$  and you can't add a fraction in sixths to  $\frac{1}{12}$  to make either of these fractions.

Extend: Jim is correct:  $\frac{1}{4} + \frac{2}{8} = \frac{6}{12}$      $\frac{1}{4} + \frac{4}{8} = \frac{9}{12}$      $\frac{2}{4} + \frac{2}{8} = \frac{9}{12}$

**Task 25: Make one and a quarter:** Examples:  $\frac{3}{4} + \frac{1}{2} = 1\frac{1}{4}$      $\frac{3}{6} + \frac{3}{4} = 1\frac{1}{4}$

$\frac{3}{8} + \frac{7}{8} = 1\frac{1}{4}$

Explain:  $\frac{19}{10} + \frac{7}{6}$

Extend:  $\frac{3}{4} + \frac{4}{8} = 1\frac{1}{4}$      $\frac{3}{8} + \frac{7}{8} = 1\frac{1}{4}$      $\frac{3}{6} + \frac{6}{8} = 1\frac{1}{4}$      $\frac{3}{4} + \frac{6}{8} = 1\frac{2}{4}$

**Task 26: Fractions of an amount:** Examples:  $\frac{2}{3}$  of 48 = 32     $\frac{2}{4}$  of 64 = 32

$\frac{2}{5}$  of 80 = 32

Explain: decreases

Extend: For question A two ways:  $\frac{1}{3}$  of 180 = 60     $\frac{2}{3}$  of 90 = 60

For question B an infinite number of ways (the denominator can always become larger, making the missing number larger).

**Task 27: Improper fractions:** 3 ways:  $\frac{17}{6} = 2\frac{5}{6}$      $\frac{17}{7} = 2\frac{3}{7}$      $\frac{17}{8} = 2\frac{1}{8}$

Explain:  $\frac{14}{4}$      $\frac{11}{3}$      $\frac{19}{5}$

Extend: Example answer  $\frac{26}{6}$      $\frac{33}{7}$

**Task 28: Make two and a quarter:** Examples:  $\frac{1}{4} \times 9 = 2\frac{1}{4}$      $\frac{3}{4} \times 3 = 2\frac{1}{4}$

$\frac{3}{8} \times 6 = 2\frac{1}{4}$

Explain: The same:  $\frac{3}{4} + \frac{3}{4} + \frac{3}{4} + \frac{3}{4} + \frac{3}{4}$      $\frac{1}{4} \times 15$      $\frac{15}{4}$

Extend: Two ways:  $\frac{6}{8} \times 5 = 3\frac{3}{4}$      $\frac{5}{8} \times 6 = 3\frac{3}{4}$

# I SEE PROBLEM-SOLVING – UKS2

## Answers

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**Task 29: Part-finished book:** 225 pages

Explain: Mistake 1: 90 is not the whole. Mistake 2: 90 is the  $\frac{2}{5}$  of the book she has left to read, not the  $\frac{3}{5}$  that she has read.

Extend: Olympic Stories 240 pages. Jack's Big Surprise 150 pages.

**Task 30: Fractions and decimals:**  $\frac{2}{3}$   $\frac{3}{4}$   $\frac{3}{5}$

Extend:  $\frac{4}{6}$   $\frac{5}{8}$   $\frac{6}{8}$   $\frac{6}{10}$   $\frac{8}{12}$

**Task 31: Combined weights:** Sam weighs 35kg.

Explain: shorter

Extend: Steph and Alice must weigh the same because, when weighed with Julie, the combined weights are the same (80kg). However, Julie may be lighter or heavier than 40kg (e.g. she may weigh 45kg and Steph and Alice could each weigh 35kg).

**Task 32: Sports ball weights:** Cricket ball = 160g

Explain: There is not enough information to know whether statement 1 is correct. Statement 2 is correct.

Extend: Volleyball = 270g. Compare statements 1 and 3 to show a football is 10g heavier than a netball. Use statement 2 to work out a football = 430g and a netball = 420g. Then insert these weights in statement 1 or 3 to establish the weight of the volleyball.

**Task 33: Hiring a surfboard:** It costs Kate £25. Jack surfs for  $4\frac{1}{2}$  hours.

Explain: The price change makes it more expensive to hire a surfboard for  $2\frac{1}{2}$  hours or less, the same price to hire for 3 hours and cheaper to hire for longer than 3 hours.

Extend: Raja expected to pay £7 plus £3 per full half-hour (7 half-hours) and £1.50 for the final 15 minutes (half of the half-hour cost). The shopkeeper charged him £7 plus 8 half-hours even though he didn't use the surfboard for all of the last half-hour.

# I SEE PROBLEM-SOLVING – UKS2

## Answers

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**Task 34: Dot pattern sequence:** Picture 8 = 25 dots. Picture 16 = 49 dots.

Explain: Sequence 1 is not one of the times tables. Sequence 2 does not go up in steps of 3. Sequence does not start with 4.

Extend: Kara is incorrect.

9<sup>th</sup> term as an addition number sentence:  $4 + 3 + 3 + 3 + 3 + 3 + 3 + 3 + 3$

9<sup>th</sup> term as 3 lots of 3<sup>rd</sup> term:  $4 + 3 + 3 + 4 + 3 + 3 + 4 + 3 + 3$  (not the same)

Lena is correct: 361 is the 120<sup>th</sup> term because  $3 \times 120 + 1 = 361$ .

**Task 35: My secret number:** 5, 6 or 7

Explain: 9, 10, 11, 12 (four numbers)

Extend: Example answer 1: multiply by **8** and subtract **7**

Example answer 2: multiply by **5** and subtract **2**

**Task 36: Sorting measures:**

Explain: Yards are not metric.

Kilograms measure weight.

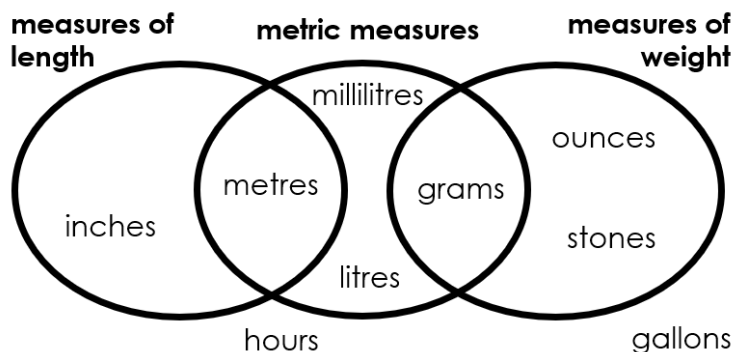
Extend: decade – time

lux – light

light year – length

centigrade – temperature

acre – area



**Task 37: Time spent driving:** 7 hours 30 minutes each week

Explain: Mistake 1: 10 journeys per week, not 5 journeys.

Mistake 2: incorrect conversion of improper fraction.

Mistake 3: incorrect conversion of 450 minutes into hours and minutes.

Extend: 104 weekend days + 35 days off = 139 days not working.

$365 - 139 = 226$  days working per year (non-leap year).

$226 \text{ days} \times 1\frac{1}{2} \text{ hours driving per day} = \mathbf{339 \text{ hours driving}}$

Note: this is 14 days and 3 hours of driving.

# I SEE PROBLEM-SOLVING – UKS2

## Answers

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**Task 38: Lengths of time:** Ordered shortest to longest: 72 hours,  $\frac{1}{2}$  week, 5400 minutes, 4 days.

Explain: 60 hours =  $2\frac{1}{2}$  days    60 seconds = 1 minute

60 days =  $8\frac{4}{7}$  weeks (or 8 weeks and 4 days)

60 days is approximately 2 months, depending on which months.

Extend: 198 hours =  $8\frac{1}{4}$  days, so 8 days and 6 hours ago

**Task 39: Ticket prices:** £4.70

Explain: 3

Extend: written algebraically with a = adult ticket and c = child ticket:

$$2a + c = \text{£}14.60$$

$$3a + 2c = \text{£}23.60$$

This shows one extra adult ticket and one extra child ticket costs £9

$$a + c = \text{£}9$$

Look at the top formula. An adult ticket must cost  $\text{£}14.60 - \text{£}9 = \text{£}5.60$

**Task 40: Missing angles:** Angle a =  $75^\circ$

Explain: Statements 1 and 4 are true

Extend: Angle b =  $50^\circ$  (other angles in the triangle are  $98^\circ$  and  $32^\circ$ )

**Task 41: Isosceles triangle angles:** Angle e =  $286^\circ$

Explain: Angle e is smaller than angle f (e =  $286^\circ$ , f =  $288^\circ$ )

Extend: Agree:  $180^\circ - \text{red angle} = \text{missing angle}$

$180^\circ - (\text{blue angle} + \text{blue angle}) = \text{missing angle}$

**Task 42: Clock hands angles:**  $75^\circ$

Explain: The hour hand is half-way between 12 and 1 at 12:30pm

Extend: Angle between each hour =  $30^\circ$

Minute hand is  $\frac{2}{3}$  around clockface so hour hand has moved  $\frac{2}{3}$  of the distance from 9 to 10. This is  $20^\circ$ . Add one hour section of  $30^\circ$ .

$$30^\circ + 20^\circ = \mathbf{50^\circ}$$

# I SEE PROBLEM-SOLVING – UKS2

## Answers

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**Task 43: Change the perimeter:** Maximum perimeter = 50 when squares arranged in a line (a rectangle with dimensions  $24 \times 1$ )

Explain: Area: shape B ( $15\text{cm}^2$ ), shape C ( $20\text{cm}^2$ ), shape A ( $25\text{cm}^2$ )

Perimeter: shape A (20cm), shape C (24cm), shape B (32cm)

Extend:  $7\text{cm} \times 6\text{cm}$  rectangle (area =  $42\text{cm}^2$ , perimeter = 26cm)

**Task 44: Rectangle length:** Length = 18cm

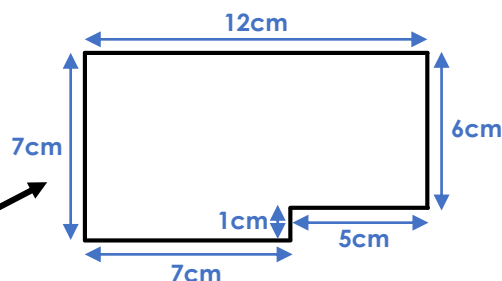
Explain: Statement 1 is true. Statement 2 is false: doubling the length of the sides of a square quadruple it's area.

Extend: notice that, for rectangles with the same perimeter, as a rectangle gets thinner the area decreases and vice versa.

**Task 45: Compound shape:**  $90\text{m}^2$

Explain: The area of the top-left section of the shape is included in both parts of the calculation, making the answer too big.

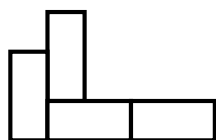
Extend: example shape with area  $79\text{cm}^2$



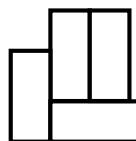
**Task 46: Combined shapes:** 52cm

Explain: Agree. The length of the sides in the middle section of the shape is increased.

Extend: Challenge 1 example:



Challenge 2 example:



**Task 47: Triangle area:** Largest length B = 17cm

Explain: Shape A does not have an area of  $49\text{cm}^2$ . Shape B is not a triangle. Shape C has 3 sides of a different length.

Extend: Length C is 23cm, 24cm, 25cm, or 26cm

**Task 48: Inside, edge or outside?** (9,14) outside (14,9) edge (13,5) inside

Explain: Statement 1 correct. Statement 2 incorrect (should be  $14 - 2$ ).

Extend: All four coordinates can be calculated given one pair of opposite corner coordinates.

# I SEE PROBLEM-SOLVING – UKS2

## Answers

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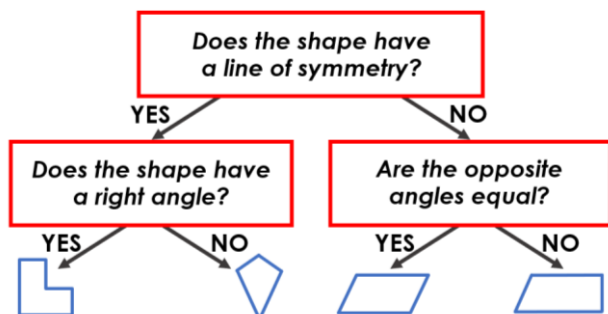
**Task 49: Which vertices?**  $A = (4,9)$ ,  $D = (4,2)$ , x coordinate of B and C unknown.

Explain: The y coordinate of (4,5) was used as the x coordinate of A. The correct x coordinate for A is 4.

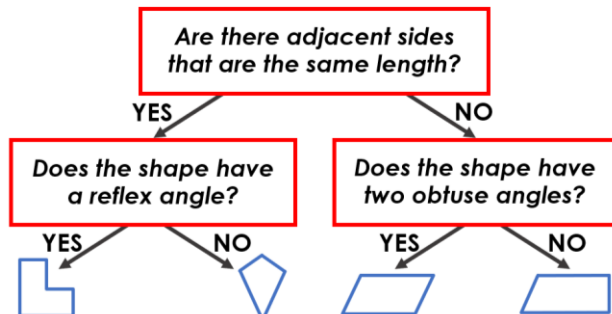
Extend: Any point on the edge between or on points B and C so the x coordinate of B and C can be determined.

**Task 50: Branching database:**

Example 1:



Example 2:



Explain: Pair A: opposite sides/angles equal; difference in angles.

Pair B: two pairs of equal length sides; adjacent sides same length on kite, opposite angles same length on rectangle.

Pair C: three identical angles/sides; one shape a pentagon and the other shape a hexagon.

Extend: First shape is a hexagon. Second shape has no lines of symmetry. Third shape is regular. Fourth shape has acute angles.

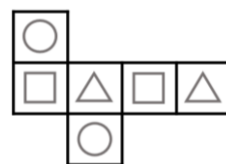
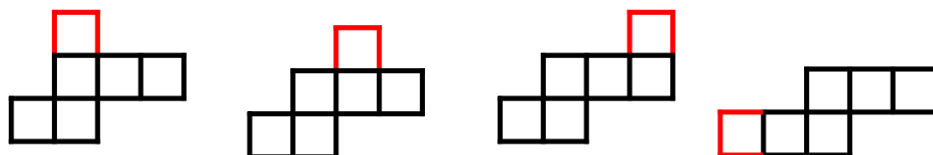
**Task 51: Cube nets:** Completed net

Explain: First shape only 5 faces.

Second shape the net of a cuboid.

Third shape has one face that folds over itself.

Extend:





# I SEE PROBLEM-SOLVING – UKS2

## Answers

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**Task 52: Cuboid dimensions:** length = 5cm width = 3cm

Explain: (c) 8 smaller cubes fit in the larger cube

Extend: (a) Double the length of one of the sides

**Task 53: Faces, edges, vertices:** 1 extra face, 4 extra edges, 3 extra vertices

Explain: Statement 1: always. Statement 2: sometimes. If you cut off the top of a pyramid, the number of faces, edges and vertices increases. If you cut off the bottom of a pyramid the number of faces, edges and vertices is unchanged.

Extend: First shape: 1 square and 4 triangles.

Second shape: 2 squares and 4 trapeziums.

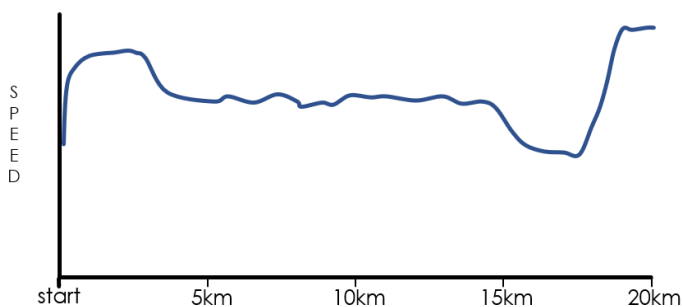
**Task 54: Before/now pie charts:** 4 more boys. 2 more from Y4, 1 more from Y5, 1 more from Y6.

Explain: All children who joined running club were boys. The running club is still made up of children from year 4, so half of the children who joined running club were from year 4.

Extend: Currently there are 16 children at running club. 4 of these children are from year 5 and 12 from other year groups. For half the children to be from year 5, there must be 8 more children joining from year 5. This means there are 12 children from year 5 and 12 children from other year groups.

**Task 55: Bike race line graphs:** Part 1: The first graph (blue line).

Part 2 example graph:





# I SEE PROBLEM-SOLVING – UKS2

## Answers

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### Task 55: Bike race line graphs (continued):

Explain: The second statement is correct. The speed of the cyclist is at its slowest here, but the rider is still moving.

Extend: Nada started the race slightly faster than Amy. Then both riders slowed down, but Nada slowed down a lot more than Amy. Both cyclists then start cycling more quickly. There is a second fall in their speeds, but Amy's reduction in speed is much smaller than Nada's. Nada has a slightly faster finish. Amy will finish the race before Nada because her overall average speed is higher.

### Task 56: Train timetables: 9:39

Explain: The first statement confuses the time the first train arrives (8:14) with the time the last train leaves Sheffield train station. The second statement is incorrect because a passenger arriving in York train station at 7:15 will miss the first train by 1 minute.

Extend: the 8:00 train from York is expected to arrive in time for the interview. However, Jen is likely to want to arrive earlier than this considering that she is going to a job interview. The 7:14 train from York may be more suitable. It is also advisable to arrive at a train station a few minutes before your expected departure time.

### Task 57: Average of 3 numbers: 3, 7, 8 or 4, 5, 9

Explain: Example 1: there are four number. Example 2: The average is not 6 (the 3 numbers have a sum of 19, not 18). Example 3: the difference between the smallest and largest number is 4, not 5.

Extend: 5 ways: 5, 6, 9, 10    5, 7, 8, 10    5, 5, 10, 10    6, 7, 8, 11    6, 6, 9, 11

### Task 58: Average ages: Harry is 15 years old.

Explain: The first statement is possible: the sum of the three children's ages must be 24. The second statement is possible: the sum of the 3 children's ages must be 27 so if the sum of the other two children's ages is 6 the brothers will have an average age 9.

Extend: Jenna is 5 years old (the twins are both 11 years old).

# I SEE MATHS RESOURCES

A range of resources for developing deep, visual mathematics can be found at [www.iseemaths.com](http://www.iseemaths.com)

The ***I See Reasoning*** eBooks provide a range of thought-provoking tasks and questions for embedding reasoning in daily lessons. For further information, click on the links below:

[I See Reasoning – UKS2](#)

[I See Reasoning – LKS2](#)

[I See Reasoning – KS1](#)

iPad app [Logic Squares](#), ideal for children in KS2, gets children applying calculation facts and thinking strategically. Numbers have to be positioned to complete the crossword-style number sentences.

Information about conferences and in-school training led by Gareth Metcalfe can be found at [www.iseemaths.com](http://www.iseemaths.com)

## **Social Media:**

**Twitter:** @gareth\_metcalfe

**Facebook:** Gareth Metcalfe Primary Maths

**Pinterest:** I See Maths