

# MATHEMATICS WORKBOOK

**"Without mathematics, there's nothing you can do. Everything around you is mathematics. Everything around you is numbers."**

Shakuntala Devi, mathematician

Name:

TG:

Teacher:

Class:

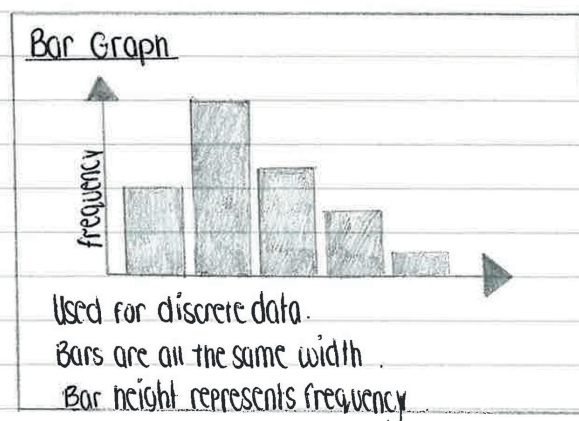
# How to present your work

C/L

3<sup>rd</sup> September 2018

## Presenting your work

- All written work must be in blue or black ink.
- All drawings and diagrams must be in pencil and clearly labelled.



- All work must have the date on the top right hand side of the page.
- All work must have C/L (Class Learning) or H/L (Home Learning) written in the top left hand margin.
- The title, date, C/L or H/L must be underlined using a ruler and a pen.
- Mistakes must be ~~erased~~ crossed out using a ruler and a pen.
- All corrections and Ticks should be completed neatly using a purple pen.

If kept carefully this book will be THE BEST REVISION GUIDE EVER as it is personalised to you and contains feedback, notes and expert advice about what you did and didn't understand.

- Bring it to every lesson.
- Take pride in it – keep it neat and well organised.
- Annotate your notes regularly with hints and tips from your teacher during the lesson.
- Act on any feedback you are given by your teacher – written or verbal. Feedback is useless if not responded to.
- Highlight key terms/ideas.
- When finished keep it safe and use it to produce your revision resources (mind maps/ index cards etc)

# How your work is marked

When your written work is marked, teachers will use these symbols:

<b>Sp</b>	Spelling mistake
<b>?</b>	Does not make sense
<b>//</b>	New idea which needs a new paragraph
<b>^</b>	Missing word
<b><u>word</u></b>	Do not use the underlined word
<b>C</b>	Use a capital letter
<b>E</b>	Give evidence to support your statement
<b>O</b>	Target punctuation placed in a circle
<b>✓</b>	Good point
<b>✓✓</b>	Excellent point
<b>PP</b>	Not following the presentation policy

## Responding to marking

The whole point of marking your work is to help you improve. This is why we insist that students respond to comments and targets that have been set by their teachers. We call this TICKS.

Each time you get your book back from your teacher with their marking in it you will be asked to spend 5 - 10 minutes going over what they have written and making any improvements they have suggested.

## Let's review our TICKS!

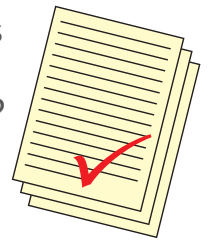
**T**urn back a few pages in your book

**I**s there a teacher comment?

**C**omplete any action points

**K**now what to do next time?

**S**ign and date it!



## My route to success

- At the back of this exercise book there are six 'My route to success' sheets, one per half term.
- At the start of each half term you will be informed of what you will be learning during the unit of work and will need to stick this information onto the relevant 'My route to success' sheet in the space provided.
- At the end of the unit of work, on the same 'My route to success' sheet, you will review the progress you have made, note down the grade and identify your learning gaps. You will also need to describe the action you are going to take to close the learning gap.

# Bar Models

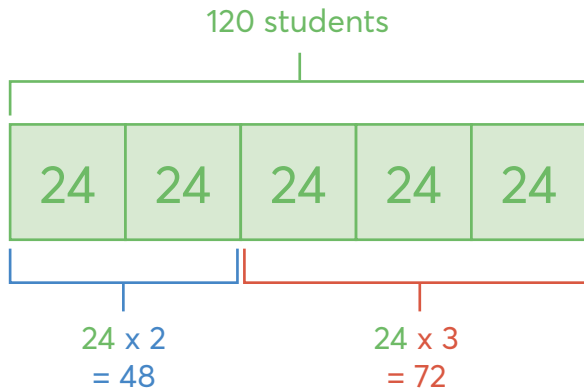
A bar model is used to represent calculations involving fractions of an amount, or sharing an amount in a given ratio.

## Fractions of an Amount Example:

There are 120 students in Year 7.

$\frac{2}{5}$  of the students are girls.

Work out the number of boys in Year 7.



**There are 72 boys in Year 7**

**Step 1:**  $\frac{2}{5}$  has a denominator of 5, so the whole is divided into 5 equal parts.

$$120 \div 5 = 24$$

**Step 2:** Each part of the bar is labelled 24.

**Step 3:**  $\frac{2}{5}$  of the students are girls, so two parts of the bar represents girls.

**Step 4:**  $\frac{3}{5}$  of the students are boys, so three parts of the bar represents boys.

$$24 \times 3 = 72 \text{ boys}$$

### Alternative Method

Find the total number of girls, and subtract this from the total number of students.

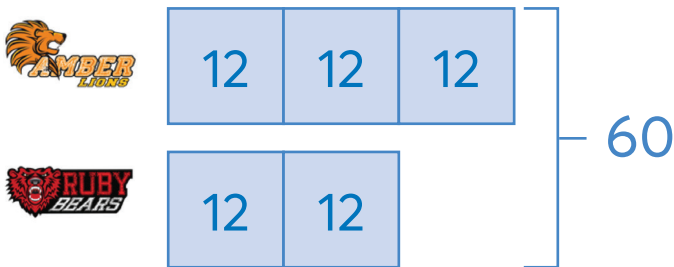
**Number of girls:**  $24 \times 2 = 48$

**Number of boys:**  $120 - 48 = 72$

## Sharing in a Ratio Example:

60 House Points are shared between the Amber Lions and the Ruby Bears in the ratio 3 : 2

How many House Points does each house receive?



$$3 + 2 = 5 \text{ shares}$$

$$60 \div 5 = 12 \text{ house points per share}$$

**Lions:**  $3 \times 12 = 36 \text{ house points}$

**Bears:**  $2 \times 12 = 24 \text{ house points}$

**Step 1:** Represent the number of shares that each house receives using a bar model.

**Step 2:** Find the value of each share, dividing the whole by the total number of shares.

$$\text{Total shares: } 2 + 3 = 5$$

$$\text{Each share: } 60 \div 5 = 12$$

**Step 3:** Multiply the number of shares by the value of each share to calculate the total amount received by each house.

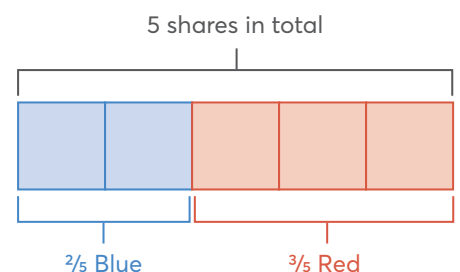
Lions:  $3 \times 12 = 36 \text{ house points}$

Bears:  $2 \times 12 = 24 \text{ house points}$

**Key Concept:** Understanding the link between fractions and ratio.

If the ratio of blue pens to red pens is 2 : 3, there are 5 shares in total.

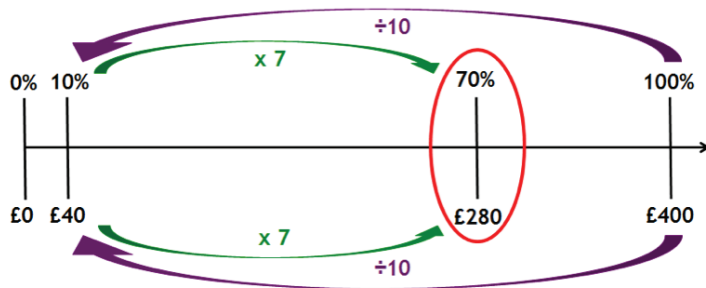
So, the fraction of blue pens is  $\frac{2}{5}$  and the fraction of red pens is  $\frac{3}{5}$ .



# Double Number Lines

A double number line is used to model **percentage** calculations. Each calculation can be modelled in multiple ways.

**Example One:** Calculate 70% of £400



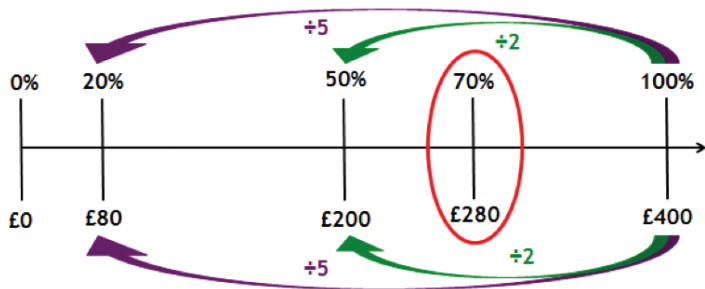
**Step 1:** Find 10%  
Divide by 10 because  $100\% \div 10 = 10\%$

$$£400 \div 10 = £40$$

**Step 2:** Find 70%  
Multiply by 7 because  $10\% \times 7 = 70\%$

$$£40 \times 7 = £280$$

**Example Two:** Calculate 70% of £400



**Step 1:** Find 20%  
Divide by 5 because  $100\% \div 5 = 20\%$

$$£400 \div 5 = £80$$

**Step 2:** Find 50%  
Divide by 2 because  $100\% \div 2 = 50\%$

$$£400 \div 2 = £200$$

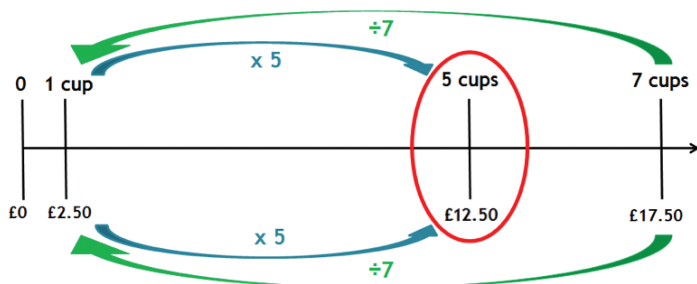
**Step 3:** Find 70%  
 $20\% + 50\% = 70\%$  so

$$£80 + £200 = £280$$

**Direct Proportion Example:**

7 cups cost £17.50  
Work out the cost of 3 cups.

A double number line can also be used to model the relationship between quantities that are in **direct proportion**.



**The Unitary Method**

**Step 1:** Find the cost of 1 cup  
 $£17.50 \div 7 = £2.50$

**Step 2:** Find the cost of 5 cups  
 $£2.50 \times 5 = £12.50$

# Directed Numbers

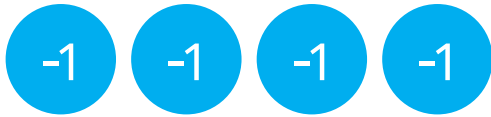
Directed number tiles are used to represent positive and negative numbers.

## Positive and Negative Numbers

This set of tiles represents 3



This set of tiles represents -4



## Zero Pairs

A 'zero pair' is equal to zero: A positive number and a negative number cancel each other out.

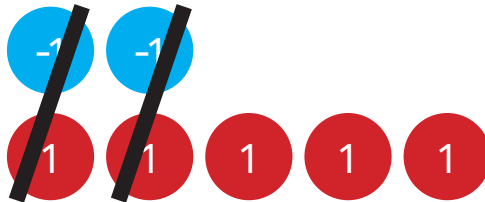
This gives us  $1 + -1 = 0$   
 and  $-1 + 1 = 0$   
 also  $-3 + 3 = 0$   
 and  $6 + -6 = 0$



Negative number calculations can be modelled with directed number tiles.

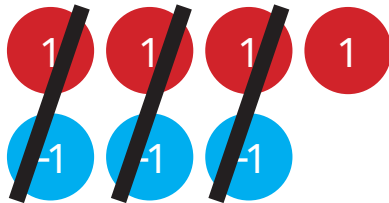
**Remember to cancel the zero pairs!**

$$-2 + 5 = 3$$



Start with -2, add 5.  
Cancel the zero pairs.  
The answer is 3.

$$4 + -3 = 1$$



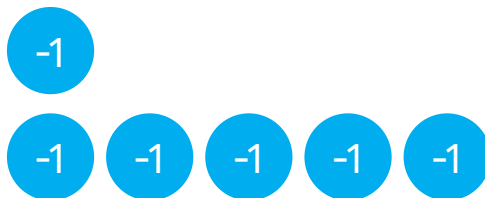
Start with 4, add -3.  
Cancel the zero pairs.  
The answer is 1.

$$1 + -6 = -5$$



Start with 1, add -5.  
Cancel the zero pairs.  
The answer is -6.

$$-4 + -1 = -5$$



Start with -4, add -1.  
There are no zero pairs.  
The answer is -5.




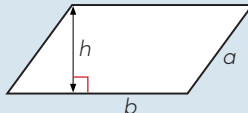
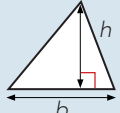
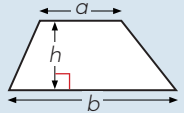
Remember: Generalised rules for addition and subtraction of negative numbers

- 1). **Adding** a **negative number** is the same as **subtracting** a **positive number**
- 2). **Subtracting** a **negative number** is the same as **adding** a **positive number**

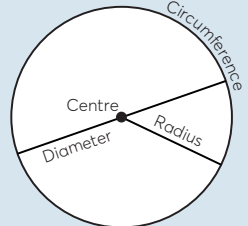
$3 + -4$  is the same as  $3 - 4$   
 $-2 + -4$  is the same as  $-2 - 4$   
 $3 - -4$  is the same as  $3 + 4$   
 $-2 - -4$  is the same as  $-2 + 4$

# Edexcel GCSE (9–1) Maths need-to-know formulae

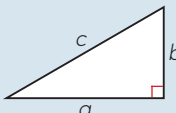
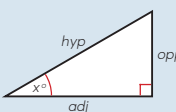
## Areas

Rectangle = $l \times w$	
Parallelogram = $b \times h$	
Triangle = $\frac{1}{2} b \times h$	
Trapezium = $\frac{1}{2} (a + b)h$	

## Circles

Circumference = $\pi \times \text{diameter}$ , $C = \pi d$	
Circumference = $2 \times \pi \times \text{radius}$ , $C = 2\pi r$	
Area of a circle = $\pi \times \text{radius squared}$ , $A = \pi r^2$	

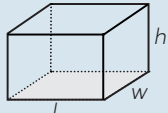
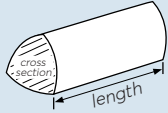

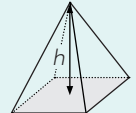
## Pythagoras

Pythagoras' Theorem For a right-angled triangle, $a^2 + b^2 = c^2$	
Trigonometric ratios ( <i>new to F</i> ) $\sin x^\circ = \frac{\text{opp}}{\text{hyp}}$ , $\cos x^\circ = \frac{\text{adj}}{\text{hyp}}$ , $\tan x^\circ = \frac{\text{opp}}{\text{adj}}$	


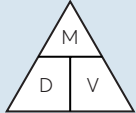
## Quadratic equations

The Quadratic Equation The solutions of $ax^2 + bx + c = 0$ , where $a \neq 0$ , are given by $x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$
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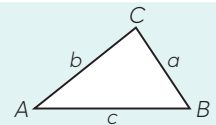
## Volumes

Cuboid = $l \times w \times h$	
Prism = area of cross section $\times$ length	
Cylinder = $\pi r^2 h$	
Volume of pyramid = $\frac{1}{3} \times \text{area of base} \times h$	

## Compound measures

Speed $\text{speed} = \frac{\text{distance}}{\text{time}}$	
Density $\text{density} = \frac{\text{mass}}{\text{volume}}$	
Pressure The formula for pressure does not need to be learnt, and will be given within the relevant examination questions.	

## Trigonometric formulae

Sine Rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$	
Cosine Rule $a^2 = b^2 + c^2 - 2bc \cos A$	
Area of triangle = $\frac{1}{2} ab \sin C$	

Foundation tier formulae

Higher tier formulae



# Numeracy

Numeracy skills	Examples
<p><b>IDEAL</b> problem solving.</p>	<p><b>I IDENTIFY</b> the problem.  <b>D DEFINE</b> and represent the problem.  <b>E EXPLORE</b> possible strategies.  <b>A ACT</b> on the strategies, evaluate your answer.  <b>L LOOK</b> back and check your answer is reasonable.</p>
<p>Explain methods using correct <b>mathematical language</b>.</p>	<p>Words you might use in subjects other than maths: <b>multiply, rate, proportion, ratio, increase, decrease, symmetry...</b></p>
<p><b>Show working</b> clearly when using written methods of calculation</p>	<p><b>Show all the steps in your working out.</b> This will not only help others understand how you worked things out, it will also improve your understanding of the method you have used.</p>
<p>Make and use sensible <b>estimates</b> of a range of measures in everyday situations in order to check the <b>reasonableness of answers</b>.</p>	<p>If asked to calculate the average height of a group of pupils, be able to decide which of these is a sensible answer: 0.3m...1.5m....12m.            Be able to calculate with money and with time:  <b>Know that 1 hour and 45 minutes = 1.75 hours.</b></p>
<p>Use <b>strategies</b> successfully to solve number related problems mentally.</p>	<p>Know your times tables up to 12 x 12.            Know the first 15 square numbers.  <b>Use <math>8 \times 7 = 56</math></b> to deduce:  <b><math>8 \times 70 = 560</math>, <math>56 \div 7 = 8</math>, <math>8 \times 0.7 = 5.6</math></b>            Know that <b><math>50\% = 0.5 = 1/2</math> and <math>10\% = 0.1 = 1/10</math></b></p>
<p>Interpret, explain and <b>make predictions</b> from <b>statistics</b> and information given in <b>graphs, charts and tables</b>.</p>	<p>Understand averages (<i>mean/median</i> and mode).            Read a <i>climate graph</i> in geography.            Draw a <i>time line</i> in history.            Interpret a <i>distance time graph</i> in science.</p>
<p>Understand <b>proportion</b> and use percentages, fractions, decimals and ratio for proportional reasoning.</p>	<p>Know that if <b>8 in 10</b> pupils at <b>LBTS</b> walk to school this means <b>4/5</b> or <b>80%</b> of pupils and that the ratio of pupils who walk to those that don't is <b>4:1</b>.            Be able to find <b>10%, 5%</b> and <b>1%</b> of any amount:  <b>10% of 240 = 24, 5% of 240 = 12, 1% of 240 = 2.4</b></p>











# My route to success – Autumn 1

End of unit grade:
Target grade:

To achieve your target grade you will need to **work hard**. This means:

1. Focusing in lessons
2. Paying specific attention to academic literacy
3. Completing all home learning tasks, including reading in your own time
4. Responding to teacher feedback / completing TICKS
5. Revising for end of unit assessments

**Stick your 'what I will be learning during this unit' sheet here**

My most important learning gaps are:

1. ....  
.....
2. ....  
.....

How I will close my most important learning gaps:

1. ....  
.....
2. ....  
.....

# My route to success – Autumn 2

End of unit grade:
Target grade:

To achieve your target grade you will need to **work hard**. This means:

1. Focusing in lessons
2. Paying specific attention to academic literacy
3. Completing all home learning tasks, including reading in your own time
4. Responding to teacher feedback / completing TICKS
5. Revising for end of unit assessments

**Stick your 'what I will be learning during this unit' sheet here**

My most important learning gaps are:

1. ....  
.....
2. ....  
.....

How I will close my most important learning gaps:

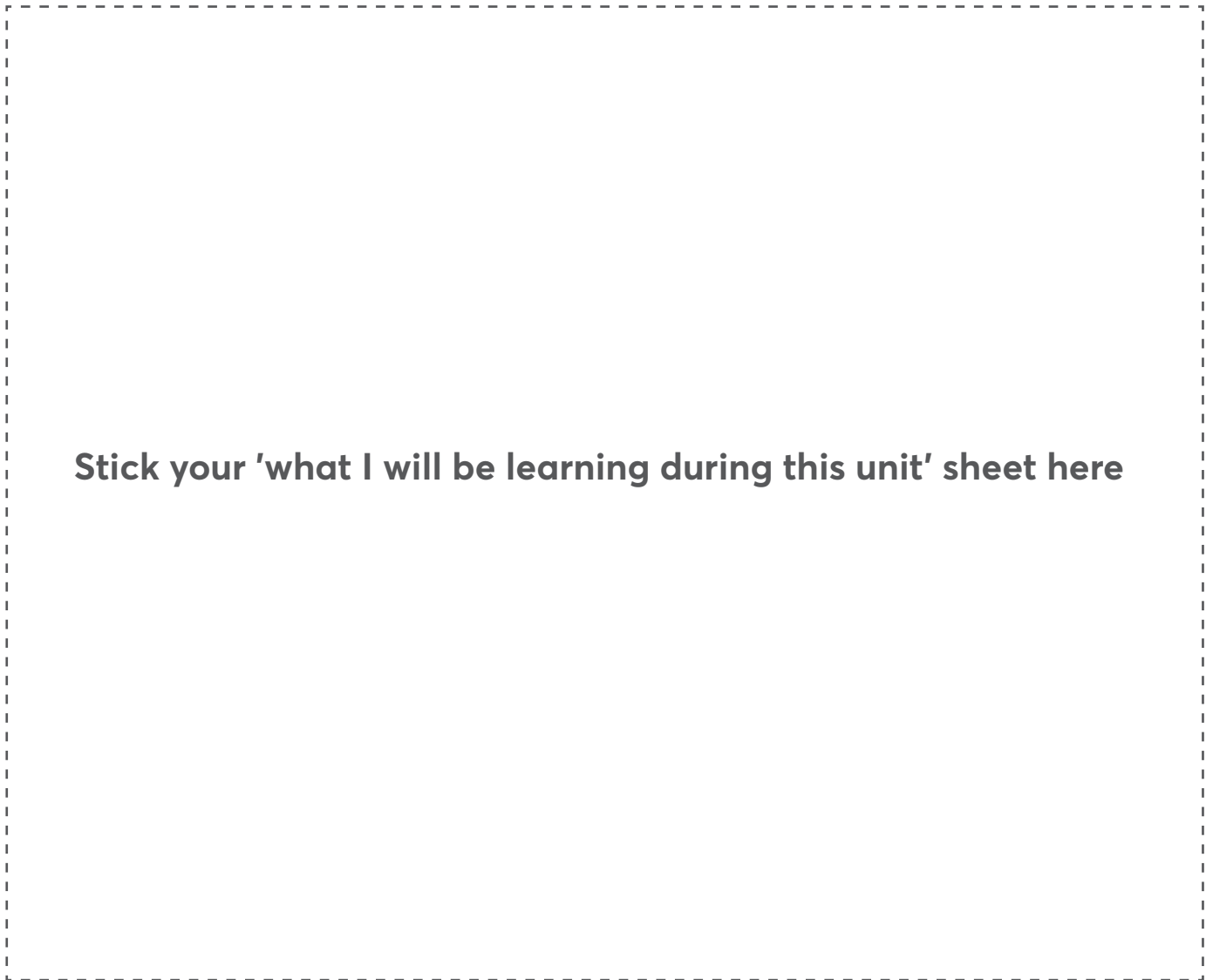
1. ....  
.....
2. ....  
.....

# My route to success – Spring 1

To achieve your target grade you will need to **work hard**. This means:

1. Focusing in lessons
2. Paying specific attention to academic literacy
3. Completing all home learning tasks, including reading in your own time
4. Responding to teacher feedback / completing TICKS
5. Revising for end of unit assessments

End of unit grade:
Target grade:



**Stick your 'what I will be learning during this unit' sheet here**

My most important learning gaps are:

1.....  
.....

2.....  
.....

How I will close my most important learning gaps:

1.....  
.....

2.....  
.....

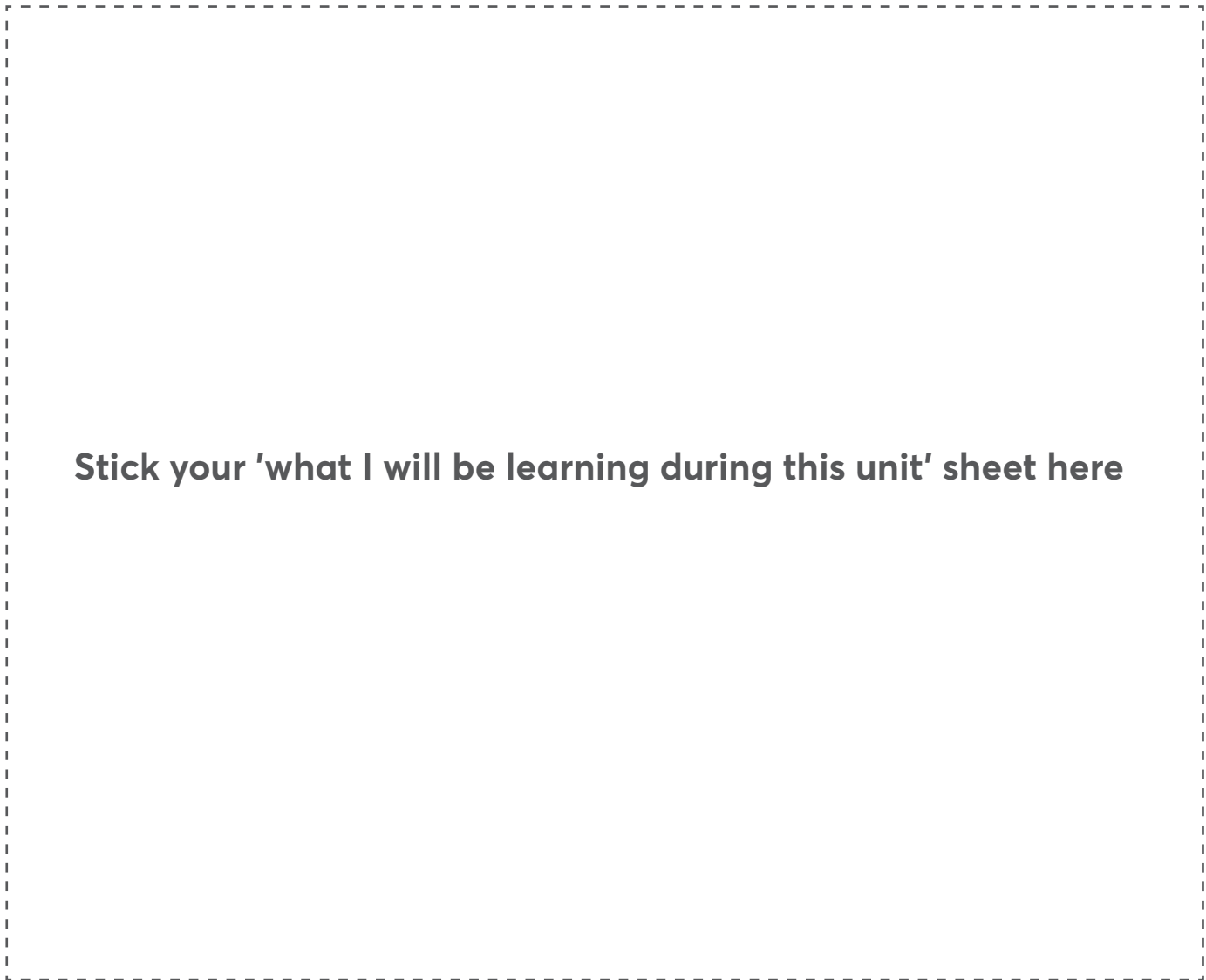


# My route to success – Spring 2

To achieve your target grade you will need to **work hard**. This means:

1. Focusing in lessons
2. Paying specific attention to academic literacy
3. Completing all home learning tasks, including reading in your own time
4. Responding to teacher feedback / completing TICKS
5. Revising for end of unit assessments

End of unit grade:
Target grade:



**Stick your 'what I will be learning during this unit' sheet here**

My most important learning gaps are:

1. ....  
.....
2. ....  
.....

How I will close my most important learning gaps:

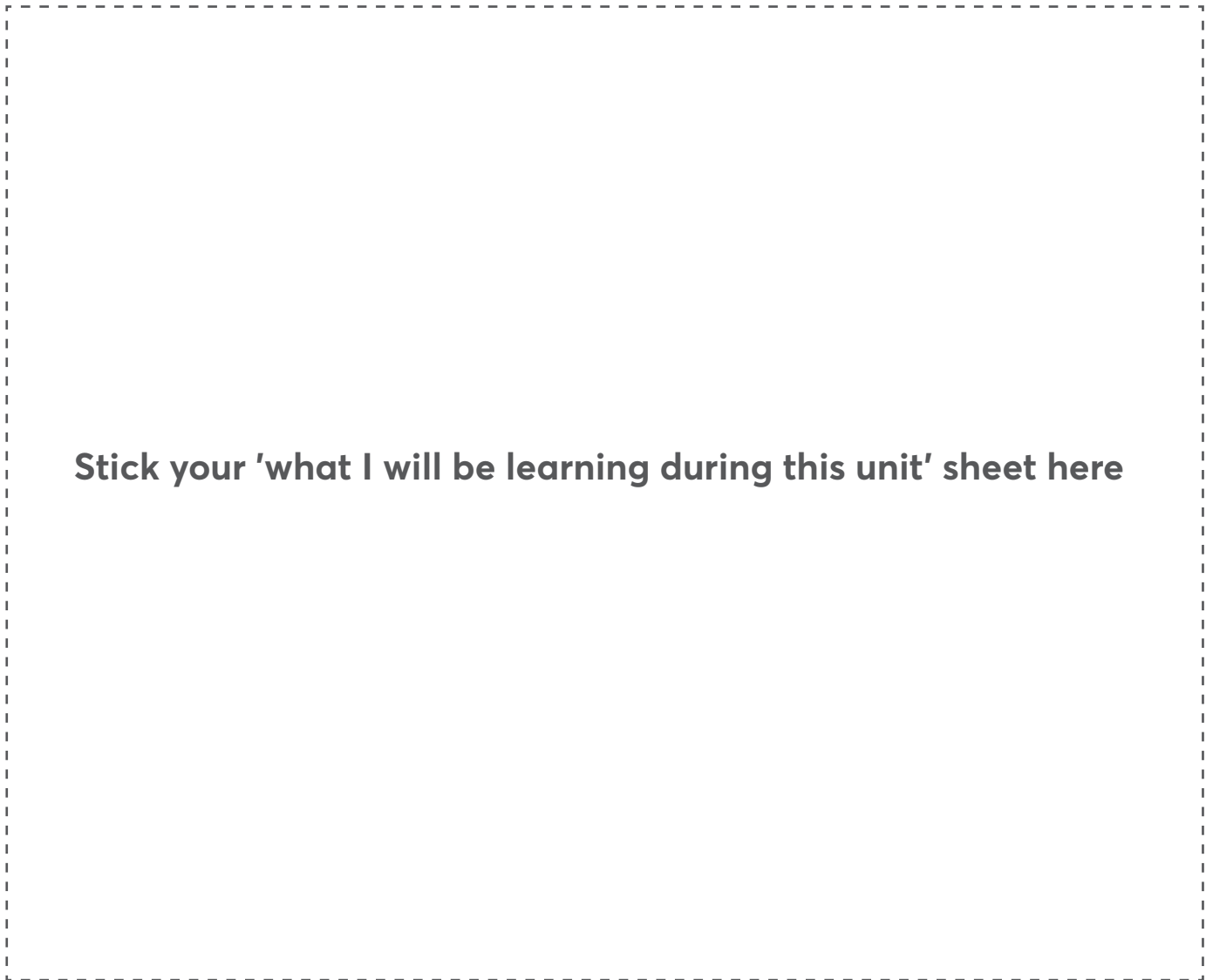
1. ....  
.....
2. ....  
.....

# My route to success – Summer 1

To achieve your target grade you will need to **work hard**. This means:

1. Focusing in lessons
2. Paying specific attention to academic literacy
3. Completing all home learning tasks, including reading in your own time
4. Responding to teacher feedback / completing TICKS
5. Revising for end of unit assessments

End of unit grade:
Target grade:



**Stick your 'what I will be learning during this unit' sheet here**

My most important learning gaps are:

1. ....  
.....
2. ....  
.....

How I will close my most important learning gaps:

1. ....  
.....
2. ....  
.....

# My route to success – Summer 2

End of unit grade:
Target grade:

To achieve your target grade you will need to **work hard**. This means:

1. Focusing in lessons
2. Paying specific attention to academic literacy
3. Completing all home learning tasks, including reading in your own time
4. Responding to teacher feedback / completing TICKS
5. Revising for end of unit assessments

**Stick your 'what I will be learning during this unit' sheet here**

My most important learning gaps are:

1. ....  
.....
2. ....  
.....

How I will close my most important learning gaps:

1. ....  
.....
2. ....  
.....

**Space for filing**

