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Fission

Y8 Fission Sample Resources

from the

Y8 Teachers' Resource and Assessment Pack

The topic **"Skills in Algebra"** can be downloaded from the website www.mathsisjugglers.com

You have permission to print this topic for use with your students.

This pack contains the **Teachers' Resources and Assessments**

for the topic "Skills in Algebra" in the Fission Guide.

You have permission to print these for use with your students.

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SUGGESTED Y8 FRAMEWORK MODIFICATIONS FOR FISSION p25-44

The Y7 Big Edd Guide, the Y8 Fission Guide and the Y9 Optimistic Guide stretch the more able students way beyond what is required by the Framework.

Almost everything that is required in the Frameworks for Y7, Y8 and Y9 is delivered in these texts, but not always in the same year as in the Framework.

This booklet provides COPYMASTER worksheets that can be used to fill in the (few) gaps.



THE FISSION GUIDE

Topic Title	Main Sections	High Level Challenges
Number Handling <i>Part 1</i>	pp05 – 22	pp23 – 28
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Symmetry	pp47 – 68	pp69 – 74
Work. w. Letters and Dir. Nos <i>Pt 1</i>	pp75 – 97	pp98 – 100
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ANSWERS	pp331 – 352	

THE BIG EDD GUIDE

At the end of each topic is a section of
HIGH LEVEL CHALLENGES.

Able students are expected to tackle these Challenges
when they have finished a section
(rather than moving onto the next section).

They can also do them in their own time.

Some of these challenges have section labels.
These indicate which section should have been completed
before that challenge should be attempted.

At the end of the book is a section of
MISCELLANEOUS HIGH LEVEL CHALLENGES.

These are not linked to any topics in the book
and can be done at any times and in any order.

They range from short problems to fairly lengthy problems,
to linked sets of problems.

The **High Level Challenges** were first used in the highly successful *Big Edd Guide*.

At Tarporley High School, students in our two top sets loved them. Almost all top set students did every High Level Challenge. Many completed all 152 of them before the end of the year, and came back and asked for more. (So there are now 200 in *Headbanger*.)

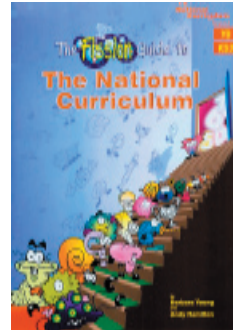
But, unexpectedly, many of the students in our two second sets tackled a lot of these problems with great enthusiasm. These students had successes with puzzles and problems that we had thought well beyond them. Confidence and motivation soared and, later, so did exam results.

Other schools using this material report similar reactions.

There are two versions of our Y8 National Curriculum Mathematics Course.

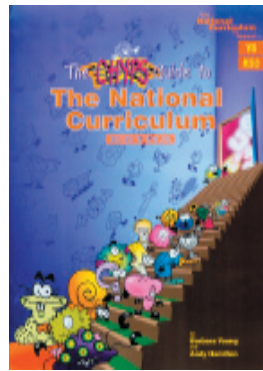
The mainstream course (*The Fission Guide*) is suitable for the upper 60% of students.

For able students, the *Fission Guide* contains **High Level Challenges** which are linked to the topics being studied and the **Miscellaneous High Level Challenges** which are independent of the topics being studied.



A5 text

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A4 text

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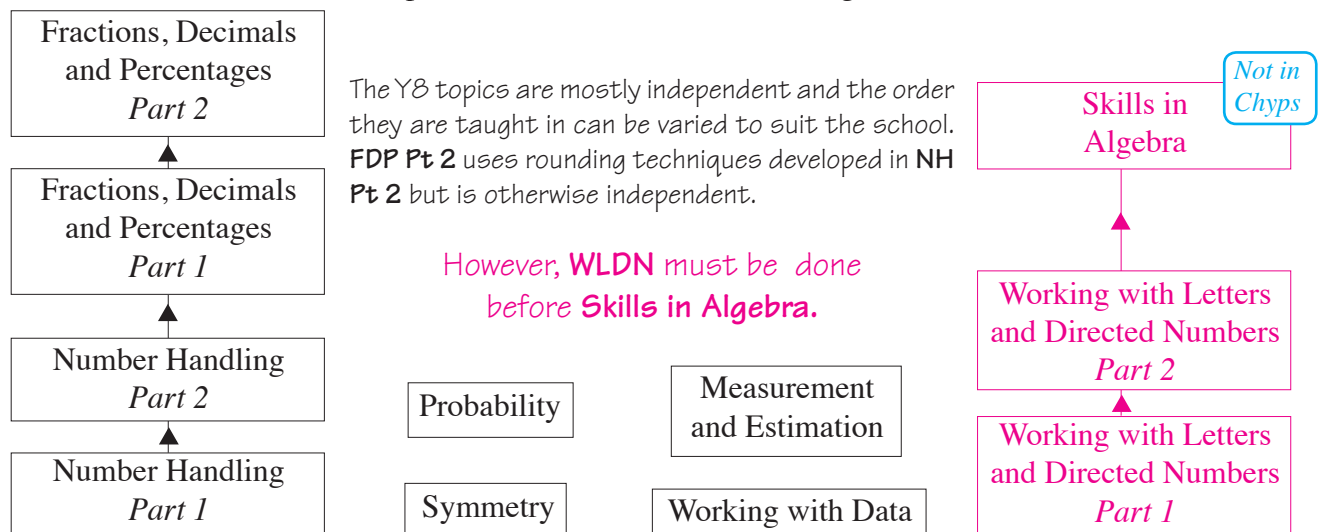
The **EXTRA** course (*The Chyps Guide*) is suitable for the lower 50% of students.

For low attainers, the *Chyps Guide* develops one idea at a time, before combining several ideas that have just been learnt. It also contains **EXTRA** rote practice exercises.

In both *Fission* and *Chyps*, three of the topics have been split into two parts because we found that this suited low attainers better. However, they can be done together as one topic, if required. An optional mid-topic test is provided for each of the split topics.

Star Challenges motivate students in both courses.

One Teachers' Resource Assessment Pack is provided for both these courses together.



The CHYPS Guide **EXTRA**

An unusual approach to Mathematics for Low Attainers – that works !!

Students in our lower sets said

“We don’t want a course that only does the easy stuff (a ‘dumbo’ course).

We want to do the same work as everyone else.

- So, will you please:
- make the instructions and explanations clearer
 - introduce ideas more slowly and put in extra steps
 - put in extra practice
 - make the work interesting”

SO WE DID !



Our EXTRA texts for LOW ATTAINERS do not follow the route of so many other texts for these students.

Instead of giving them lots of easy material, we took the syllabus and delivered it in such a way that LOW ATTAINERS could understand and cope with the ideas and techniques.

We gave them what they had asked for !!

But we couldn’t have produced these texts had it not been for the active help of the students themselves. We started with the mainstream texts and students really enjoyed finding out what didn’t work for them - but, more importantly, WHY!! They quickly became expert at pinpointing where the material didn’t work for them and helping to find what would work for them.

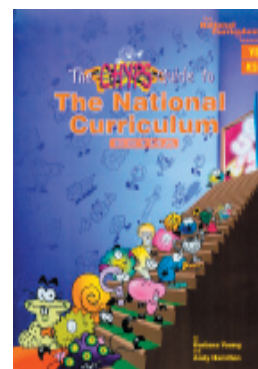
Devising ways that would work took a lot of working/trialling with LOW ATTAINERS, but we ended up with the EXTRA texts – which work exceptionally well, particularly with bottom sets, disaffected students and students at Pupil Referral Units.

This **EXTRA** course :

- has been specially developed for low attainers
- is a version of the Y8 Framework course
- has lots of EXTRA practice on all techniques
- can be run alongside the mainstream course
- can stand on its own
- is suitable for the lower 50% of the ability range

Each student:

- takes responsibility for his/her own learning
- can decide how much practice (s)he needs to do for each technique
- can try Star Challenges when (s)he feels ready for them
- will be capable of taking the mainstream tests



ISBN-13: 978-1-905081-17-0

The authors firmly believe that all students can tackle the material in the mainstream course. However, some students need :

- more time to get to grips with the ideas and techniques involved
- lots of EXTRA practice
- one idea at a time introduced step-by-step
- to meet ideas and techniques over and over again

Most students in lower sets are underachieving.
This course aims to raise the level of achievement of these students.
Students can transfer to or from the mainstream course.

How does the Star Challenge system work ?

The number of stars is a measure of the difficulty of the Challenge.

So, one star denotes a basic fairly easy challenge.

However, students should not be discouraged from attempting any Challenges.

For example, students may earn fewer stars from many two or three star challenges, with partially correct answers.

Students of lower ability can amaze you with what they can achieve, if they really want to tackle problems that you might think beyond them.

A true cautionary tale

Three very low ability students were working together. They had to. Mark was severely dyslexic - he could not read at all. Jason could read very well, but could make no sense of what he was reading. Matthew was very slow at everything. Between them, they could tackle problems.

Jason would read the question. Mark would explain what it was all about. Together the three of them would work out how to solve the problem.

One day they had done all the one star problems. They asked me if they could try the three star problem - The Chest of Drawers. It contained a mixture of fractions and decimals and both cm and mm. My first reaction was to tell them that it was too difficult for them - but I said they could try it, provided they accepted that they might not be able to do it.

About ten minutes later, they brought me the correct answer. I couldn't believe that they had solved such a complex problem. I changed the data (marked below in blue). They were back a few minutes later with the correct answer. Then I made a big mistake. I asked them to tell me how they had worked it out. I couldn't follow their explanation at all !!

From then on I never restricted the choice of Star Challenges of even the least able students.

Star Challenge

The chest of drawers

A chest of drawers 84 cm high has a 42.5 mm top and a 90 mm base. Four identical drawers fit in between, with 22.5 mm between each drawer.

Work out the height of each drawer in cm.

If the 22.5 mm gaps were reduced to 12.5 mm each, what would be the height of each drawer then?

84 cm

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

$2\frac{1}{4}$ cm

9 cm

What do schools do with the stars students earn for Star Challenges ?

One school:

- gives a house point for each star.
- has a commendation system and awards a commendation for so many stars. They also award stars for effort when the books are taken in each fortnight.
- gives a smiley face for 5 stars
- gives a Mars Bar for 10 stars
- gives a copy of one of a group of Chaos posters for 20 stars (very popular with low attainers)
-

It doesn't matter what you do. It is the sense of achievement that is most important.

However, a system that awards something for so many stars, then starts them collecting the next set of stars, means that students keep track of how many stars they have and how many more they need towards the next 'prize' – instead of (possibly invidious) comparisons of the total number of stars each student has.

THE NATIONAL CURRICULUM AND BEYOND ...



Fission

The Fission Guide *to the* National Curriculum

Skills in Algebra

By the end of this topic, you should be able to:

- Level 5
 - use algebraic rules
 - put numbers in algebraic expressions
- Level 6
 - solve simple equations
 - solve more difficult equations
 - solve simple equations systematically
 - solve equations with letters on both sides
- Level 7
 - solve inequalities
 - solve problems using algebra
 - solve equations with fractions
 - solve equations with brackets

Order a **half price** copy of Y8 Fission and/or Y8 Chyps
using the Special Offer form
which can be downloaded
from the website
www.mathsisjugglers.co.uk

Skills in Algebra

Fission only Teachers' Guide

Printing list	Pages in Books	Pack Page
Star Challenge 2H	p281(F)	p 118
Star Challenges 5H & 6H	p287 (F)	p 102
Star Challenge 9H	p295 (F)	p 103
Ch 6: Equation square puzzles	p305 (F)	p 104
Ch 16: The mega-challenge crossword	p310 (F)	p 105

This topic follows on from “Working with Letters and Directed Numbers”, reviews the algebraic skills learnt there and introduces new techniques. The first three sections are accessible to everyone. Beyond that, each student goes as far as they can, depending on their mathematical development.

Section 1: Simple algebraic expressions

This section reviews the meaning of some common algebraic expressions. There is a wide variety of puzzles and games.

P2: Highest score wins provides practice in using simple algebraic expressions and in using negative numbers.

Section 2: More complex algebraic expressions

Here students meet more complex expressions, including the kinds that normally cause problems when not properly understood.

Whilst all students should be allowed to try the work in this section, it is mostly aimed at the more able student. but, you will be surprised at how many students will work successfully with these expressions. Puzzles are a great motivator.

For those who are not the most able students, often all that is needed is for the teacher to go carefully through the meaning of each of the expressions with them, before they get started.

Section 3: Equations

We return to the puzzles that students enjoyed so much in “Working with Letters and Directed Numbers” and use them to introduce equations. The aim of this section is to get students used to the meaning of the words **expression**, **equation** and **solution** and understand what is meant by the instructions **solve the equation** or **find the solution to the equation**. No equation-solving techniques should be taught here. Students are meant to devise their own methods of solving the equations – and they are very keen to do so.

Beyond this point the material is all individualised work. The concepts and the skills required will gradually increase in difficulty. It is intended that each student should proceed as far as (s)he can, depending on their state of mathematical development. They are assured that any skills not developed at this stage will be met again later in the course.

Each student will develop a series of techniques for solving different types of equations. It is important that they master the skills at each stage, before moving onto the next stage. All algebraic skills need practice. The more practice that they do, the more skillful they become. Racing through the material, without doing sufficient practice at each stage, means that the limit of what they will be able to do will be reached earlier in the material.

Section 4: A systematic approach to solving equations

In section 3 they discovered how to solve equations for themselves, So, in order to convince them that they need to learn some rather boring techniques, we first let them trip over some equations that they cannot solve in **D1: The story so far...**

They are then given these instructions:

You are now going to learn some techniques for solving complex equations. However, to understand these techniques more easily, you will first learn how to solve simple equations – the sort you can already solve for yourself. Then you will apply these techniques to solving the difficult equations.

They are introduced to the, by now fairly standard, method of solving equations by the balancing method. What is new here is that they always put down both sides of the set of equations the operation they are doing to get from one line to the next. They start by putting the operations down both sides, but fairly soon are allowed to take a short cut and only put it down one side. From now on, throughout this booklet, and the ones that follow it and use equation–solving techniques, we will insist on equations always being solved in this way. Although we want students to enjoy working with algebra, we feel strongly that algebraic excellence comes from developing good practice. Insisting on always showing the working, and the operations used, will mean students will progress further faster in the field of equation–solving and algebraic manipulation. We would like to see a lot more students coming through to do A–level maths with rock–solid algebraic competence.

Sections 4 – 9

The only way to develop competence is through practice and each section is choc–a–bloc with practice. Each student should decide for her/himself how much they need to do at each stage. There are puzzles, problems and challenges, but mostly it is just basic rote practice. However, we have here students who understand what they are doing and who are being trained to decide for themselves how much practice to do at each technique – and there is something satisfying in solving lots of equations – especially when they are getting them right!

So, talk through what you expect of them – and let them get on with it!

All students ought to be able to cope with Section 4.

Sections 5 – 8 can be tackled in any order.

Section 9 is only for the most able.

How important are algebraic games ?

Algebraic games are used in Sections 1, 2 and 3. They are not just nice additions to the material. They are very important parts of these sections.

The intention here is to establish firm algebraic foundations with students of all abilities. If less able students spent most of their time playing these games, the time would be very well spent. Abler/faster students will develop much better algebraic skills if they work at these games until the skills involved become second nature. The aim in these three sections is to develop intuitive skills and responses, rather than remembered techniques.

The techniques are developed in Sections 4 – 9, in “Extending Algebraic Techniques” in Y9, and in the KS4 booklets.

Skills in Algebra

Fission only

Star Challenge Answers

1H

K: 7,10,3,18,20,4; N-16 or
M: 15,4,9,7,3,10; N+5

$\frac{1}{5}N$

L: 10,21,8,2,3,12; N + 9 or 4N
N: 2,3,-2,2,5,6; N+3 or 2N+1, or 3N-1

All correct = 1 star

2H 2H

Dominoes 1 6, 11, 21, 9, 7, 10, 3, 5, 25, 8, 2, 4, 13, 20, 6

Dominoes 2 6, 11, 10, 14, 12, 9, 10, 8, 5, 16, 4, 13, 7, 4, 6

Note: Dominoes 2 is more difficult because at one point you have to choose between two tens and this can cause problems.

2 correct Tasks = 2 stars
1 correct task = 1 star

3H

All correct = 1 star

4H 4H

N = 3

15-16 marks = 2 stars
12-14 marks = 1 star

1. $\begin{matrix} 4 & 21 \\ 3 & 11 \\ & 9 \end{matrix}$
(6 marks)

2. $\begin{matrix} 8 & 5 \\ 4 & 3 \end{matrix}$
(5 marks)
(b) Yes (c) Always

3. $\begin{matrix} 14 & 15 \\ 4 & 5 \end{matrix}$
(5 marks)
(b) Yes (c) Only with 5 in P

5H

All correct = 1 star

R Y G G Y B
Y R O O B Y
O G R B G O
O G R B G O
Y R O O B Y
R Y G G Y B

6H 6H

34-36 correct = 2 stars
30-33 correct = 1 star

R G Y P P Y
G B G O O R
R G B G O G
P O P B Y R
R O O Y B Y
O P P O Y R

7H

13-15 correct = 1 star

1. 2 2. 2 3. 2 4. 1
5. 2 6. 5 7. 4 8. 2
9. 8 10. 10 11. 20 12. 16
13. 10 14. 21 15. 21

9H 9H

40-43 correct squares = 2 stars
34-39 correct squares = 1 star

1	2	3	3	1	4					
5	4	1	2	2						
	7	2	6	8	1	1	2			
10	1	3	11	5	3	12	1	13	4	
	7		14	2	1	15	7		8	
	16	3	1	17	5	1	18	3		
19	3		20	1	21	2	3	22	1	6
23	4	2		9		24	4	0		

Stars will not be awarded unless all working is shown for each of these equations.

8H

13-15 correct = 1 star

1. 4 2. 3 3. 3 4. 4
5. 2 6. 6 7. 4 8. 2
9. 2 10. 1 11. 3 12. 3
13. 2 14. 3 15. 10

10H

8-9 correct = 1 star

1. $c < 7$ 2. $t \leq -3$ 3. $c < 3$ 4. $p < -4$ 5. $m > 5$
6. $x \geq 3$ 7. $x < -2$ 8. $m > 6$ 9. $n < -2$

11H

12-14 marks = 1 star

1. (a) $2p + p - 5$ or $3p - 5$ (1 mark) (b) 70 (1 mark) (c) 115 (1 mark) (d) 35 (3 marks)
2. (a) $x + 5$ (1 mark) (b) $2x + 5$ (2 marks) (c) $2x + 5 = 23$ (1 mark)
(d) $x = 9$ (2 marks) (e) 9 & 14 (2 marks)

Skills in Algebra

Fission only

Star Challenge Answers

12H 12H

1. 2 2. 1 3. 3 4. 3 5. 7 6. 3
7. 4 8. 4 9. 4 10. 5 11. 2 12. 7

11-12 correct = 2 stars
8-10 correct = 1 star

13H 13H 13H

1. 6 2. 12 3. 21 4. 6 5. 10 6. 7
7. 4 8. 10 9. 8 10. 2 11. 4 12. -4

12 correct = 3 stars
10-11 correct = 2 stars
6-9 correct = 1 star

14H 14H

1. 20 2. 72 3. 10 4. 9 5. 42 6. 180
7. 4.5 8. 33.6

7-8 correct = 2 stars
5-6 correct = 1 star

Ch 1: The structure of a Magic Square

25 marks = 3 stars
23-24 marks = 2 stars
20-22 marks = 1 star

1. A

3	4	8
10	5	0
2	6	7

 B

3	17	13
21	11	1
9	5	19

 C

13	7	4
-1	8	17
12	9	3

 (3 marks)

2. Magic Sum = 3 x middle square (2 marks)
3. The differences are the same. (2 marks)
4. 27 (1 mark)
5.

$m-p$	$m+p-q$	$m+q$
$m+p+q$	m	$m-p-q$
$m-q$	$m-p+q$	$m+p$

 (4 marks)
6. Checking letters using given values of m, p and q (0 marks)
7. $m = 11, p = 8, q = 2$ (3 marks)
8. Numbers 1,2,3,4,5,6,7,8,9 (1 mark)
9. All prime numbers (1 mark)
10. (a) making 4 magic squares for use in (b) and (c) (0 marks)

(b) 13 (1 mark) (c)

19	1	19
13	13	13
7	25	7

 (1 mark) (d)

$2m-7$	1	$m+6$
13	$2m-13$	
$m-6$	$2m-1$	7

 (6 marks)

This is why (b) is so. 22 marks = 3 stars
20-21 marks = 2 stars
18-19 marks = 1 star

Ch 2: Diabolical magic squares

1. P

4	11	18	13
17	14	7	8
15	16	9	6
10	5	12	19

 (3 marks) Q

5	18	7	14
20	12	3	9
2	10	19	13
17	4	15	8

 R

3	21	14	22
24	12	13	11
16	8	27	9
17	19	6	18

2. R (3 marks) 3. $a = 3, b = 5$ (2 marks) 4. $10a + 6b$ (2 marks)
5.

2	19	11	18
21	8	12	9
14	7	23	6
13	16	4	17

 (4 marks) 6.

3	12	11	16
15	12	7	8
10	5	18	9
14	13	6	9

 (4 marks) 7.

-2	17	1	6
15	-8	12	3
10	5	13	-6
-1	8	-4	19

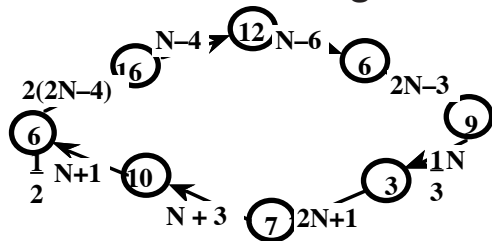
 (4 marks)

Ch 3: Diabolical challenge

$a = 1$ $b = 4$

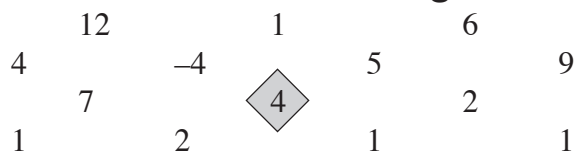
1 star for correct answers
2 stars for explaining how you get them

Ch 4: Rule matching



All correct = 1 star

Ch 5: Diamond latti challenge



13 correct = 2 stars
10-12 correct = 1 star

Ch 6: Equation square puzzles

For each of two puzzles, students have been asked to put the nine pieces of the puzzle into a square, so that every equation is next to its solution. There are many possible solutions.

1 star for each correct puzzle

Ch 7: Think for yourself

1. 7 2. 8 3. 7 4. 11 5. 11
6. 3 7. 3 8. 6 9. 9 10. 10

18-20 marks = 2 stars
14-17 marks = 1 star

Ch 8: Challenge equations

All working must be shown.

24-30 marks = 2 stars
18-23 marks = 1 star

1. $3\frac{1}{2}$ 2. $1\frac{3}{7}$ 3. $1\frac{1}{2}$ 4. $7\frac{1}{2}$ 5. $\frac{6}{7}$ 6. $-\frac{5}{8}$ 7. $-\frac{2}{3}$ 8. -2 9. $\frac{3}{11}$
10. $6\frac{1}{2}$ 11. $-1\frac{1}{6}$ 12. -1 13. -7 14. $-2\frac{1}{2}$ 15. $\frac{7}{9}$

Ch 9: More difficult inequations

All working must be shown.

21-24 marks = 2 stars
17-20 marks = 1 star

1. $x > 7$ 2. $y < 5$ 3. $m < -1$ 4. $x \geq 2$ 5. $c > 2$ 6. $z < 3$
7. $d \leq 20$ 8. $e \leq 1$ 9. $m < 4$ 10. $c < -6$ 11. $x \geq 9$ 12. $e < 3$

Ch 10: Inequation challenge

All working must be shown.

24-30 marks = 2 stars
18-23 marks = 1 star

1. $z > -3$ 2. $w > 1.4$ 3. $d \geq 10$ 4. $u \leq 8$ 5. $p > -2$
6. $y > 0.5$ 7. $p \leq 3.5$ 8. $m > 1.5$ 9. $x > 1$ 10. $v \geq 4.5$
11. $x < 4\frac{1}{3}$ 12. $n < 3.5$ 13. $n \leq 10$ 14. $s < 12$ 15. $p \geq 3$

Ch 11: Geometry problems

1. (a) $3x$ (b) $3x = 90^\circ$ (c) $x = 30^\circ$ (d) 30° and 60°
2. (a) $5x + 55 = 180$ (b) 25 (c) 25° and 100°
3. (a) $8x + 120 = 360$ (b) angle Y = 30° , angle Z = 60° , angle W = 150°
4. (a) $2x + 40 = 180$ (b) 70
5. (a) $3x + 30 = 180$ (b) 50(c) 50° and 100°
6. (a) $96^\circ, 96^\circ, 144^\circ, 144^\circ$

18-20 marks = 2 stars
14-17 marks = 1 star

Ch 12: Perimeter problems

1. (a) $4x + 8$ (b) 28 (c) 48 (d) $4x + 8 = 16$ (e) 2 (f) 6cm and 2 cm
2. (a) $6x - 8 = 52$ (b) 10 (c) 15cm and 11 cm
3. (a) $6x = 48$ (b) 16 cm and 8 cm 4. 3cm, 8cm, 7cm 5. OR = 11cm

18-20 marks = 2 stars
14-17 marks = 1 star

Ch 13: Multiplying by negative numbers

1. 4 2. 3 3. 7 4. 3 5. 11 6. 6 7. 5 8. 6 9. -13 10. 0

Ch 14: Get the message

Universal Peace

25-32 marks = 2 stars
18-24 marks = 1 star

Ch 15: Fraction challenge

1. 2 2. 6 3. -0.5 4. 3 5. 4.4 6. 3 7. -1 8. $\frac{32}{33}$

Ch 16 : The mega-challenge crossword

1	2	5		3	6		4
	3		5	2	2		6
7	1		8	3	3		9
10	2	5		11	1	1	0
	0		13		0		14
		16	2	17	2		18
19	3	4		20	4	8	21
	7		22	9		23	8

Six-to-six dominoes

Cut out each set of dominoes. Put each of these sets of dominoes in order. The number following each rule is made from the number before it, using the rule. Write down the numbers in the correct order. [Take care not to get the sets mixed up !]

Dominoes 1

START 6	$N+5$	5	$4N+5$
7	$2N-4$	11	$2N-1$
13	$2(N-3)$	6	FINISH
2	$-N+6$	3	$8-N$
8	$N+2$	9	$1N+4$
20	$1(N-2)$	21	$1(N-3)$
4	$3N+1$	4	$3N+1$
9	$N+1$	10	$\frac{N-1}{3}$
13	$N-6$	16	25
8	$1(N+2)$	10	$1N+3$
12	$1N+5$	25	5

Dominoes 2

START 6	$2N-1$	7	$2N-10$
8	$1(N+2)$	11	$2(N-6)$
12	$1N+5$	6	FINISH
4	$3N+1$	5	$2(N+3)$
9	$N+1$	10	$2N-6$
13	$N-6$	16	$20-N$
4	$3N+1$	4	$N+2$
9	$N+1$	10	$1N+3$
13	$N-6$	14	$3(N-10)$
8	$1(N+2)$	10	2
12	$1N+5$	25	5

• Show your solutions to your teacher.

Star Challenge **5H**

All correct = 1 star

One star solution pattern

Solution – colour key

Solution	1	2	3	4	5
Colour	Red	Blue	Green	Orange	Yellow

Solve each equation.

Colour each rectangle with the solution colour.

(For example: each equation with solution 1 is coloured red.)

$p + 3 = 4$	$2c + 3 = 13$	$5k = 15$	$2a + 1 = 7$	$3p - 10 = 5$	$3p + 1 = 7$
$2j - 1 = 9$	$2r + 1 = 3$	$12 - n = 8$	$2m = 8$	$6t = 12$	$4b - 11 = 9$
$6p + 1 = 25$	$3x - 2 = 7$	$5s - 4 = 1$	$5 + 3p = 11$	$10c - 5 = 25$	$3 + 2p = 11$
$2v - 1 = 7$	$5 + q = 8$	$3r - 1 = 2$	$5z - 1 = 9$	$5 + 2f = 11$	$4 + u = 8$
$w + 3 = 8$	$5 + 2b = 7$	$2n - 1 = 7$	$3b + 1 = 13$	$3 + 3d = 9$	$6 - m = 1$
$9 - 4e = 5$	$3k + 1 = 16$	$4y = 3y + 3$	$10 - g = 7$	$2y = 10$	$4n + 3 = 11$

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• Show your answers to your teacher.

Star Challenge **6H 6H**

34-36 correct = 2 stars

30-33 correct = 1 star

Two star solution pattern

Solution – colour key

Solution	2	3	4	-1	-2	-3
Colour	Yellow	Red	Blue	Green	Orange	Pink

Solve each equation.

Colour each rectangle with the solution colour.

$10 + 2v = 16$	$7 + m = 6$	$3z + 1 = 7$	$2x + 5 = -1$	$4 - f = 7$	$10p - 1 = 19$
$2 + 3r = -1$	$8 - 3p = -4$	$5 - q = 6$	$4 + 2r = 0$	$13 + s = 11$	$1 - q = -2$
$7n - 1 = 20$	$2 - w = 3$	$4d - 1 = 15$	$4t + 7 = 3$	$2t + 4 = 0$	$s + 4 = 3$
$2f + 4 = -2$	$p + p + p = -6$	$h + 3 = 0$	$7 + 2k = 15$	$4m + 3 = 11$	$9 - 2k = 3$
$5u - 2 = 13$	$2y - 3 = -7$	$5 - k = 7$	$8 - 3r = 2$	$c + 2c = 12$	$7 - k = 5$
$3k + 7 = 1$	$4 - x = 7$	$j + j = -6$	$p + 1 = -1$	$4 + t = 3t$	$5b + 2 = 17$

Remember: $-(-2) = +2$

• Show your answers to your teacher.

Fission Guide : page 287

Star Challenge 9H-9H

40-43 correct squares = 2 stars
34-39 correct squares = 1 star

Crossnumber equations

The answers to this crossword are the solutions to each of the equations below.

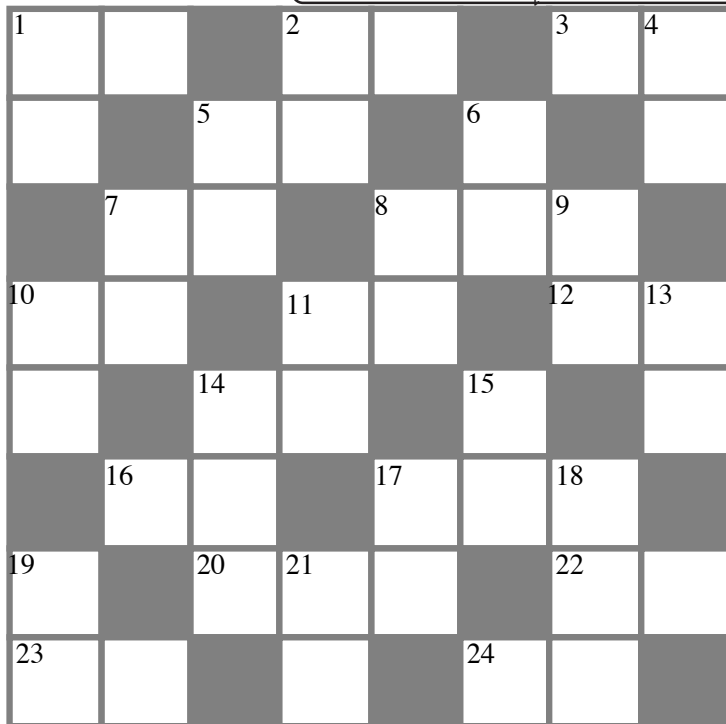
Take one double spread of your book.

Stick this worksheet on one of the pages.

Solve each of the equations

on the other page.

Show all working out.



Across

Down

1. $3p - 15 = 21$
2. $2n - 16 = n + 17$
3. $x - 3 = 25 - x$
5. $5 + 2b = 128 - b$
7. $2h - 14 = h + 12$
8. $120 - z = 8$
10. $b + 7 = 2b - 6$
11. $2k - 6 = 100$
12. $15 - x = x - 13$
14. $1p + 1 = 8$
3
16. $2s + 3 + s = 34 + 2s$
17. $2t - 26 = 1000$
20. $x - 23 = 100$
22. $5 + 2p = 21 + p$
23. $2g - 100 = 26 - g$
24. $10m = 400$

1. $5y = 60 + y$
2. $2p + 3 = 65$
4. $3q = 2q + 42$
5. $5c + 4 = 4c + 50$
6. $10e + 2 = 8e + 44$
7. $3f - 9 = 60$
8. $20 - a = 7$
9. $3r - 13 = 50$
10. $5x + 12 = 4x + 29$
11. $100 - m = 49$
13. $100 - 2j = j - 44$
14. $v - 200 = 11$
15. $3x - 33 = 2x + 38$
17. $2y - 6 = 100$
18. $5n - 150 = 4n + 160$
19. $t + 6 = 74 - t$
21. $50 - q = 21$

Stars will not be awarded unless all working is shown for each of these equations.

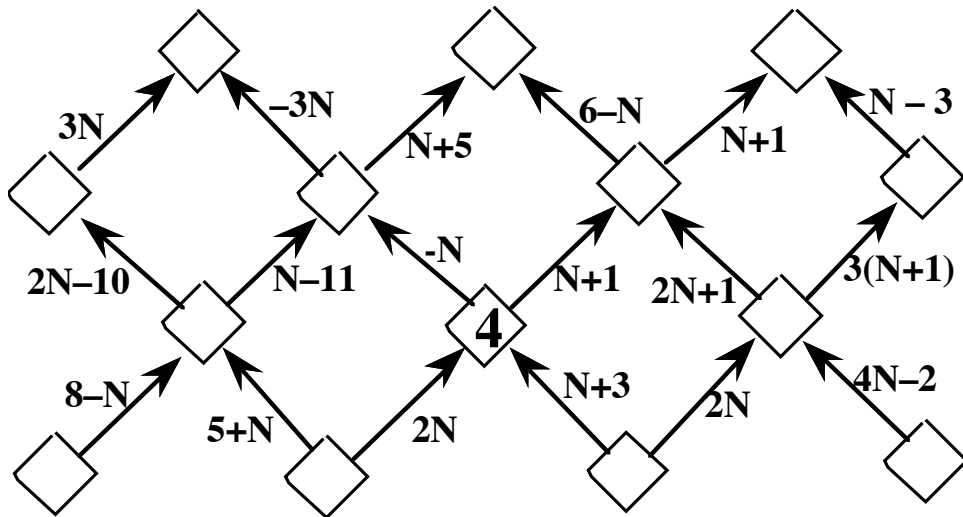


Ruff

• Show your answers to your teacher.

Ch 5: Diamond lattice challenge

Fill in the numbers in the rest of the diamonds.



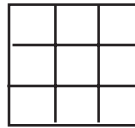
Fission Guide : page 305

Ch 6: Equation square puzzles

For each of these puzzles:

- cut out nine pieces of the puzzle;
- put the pieces into a 3 x 3 square so that every equation is next to its solution.

for example: $\frac{x + 1 = 10}{9}$



Puzzle 1

5 1	10 0 $5n - 1 = 24$	3 $n + 5 = 9$	6 $16 = 2n$ $3n + 1 = 22$	2 8 $7 + n = 7$ $2n + 1 = 13$
--------	--------------------------	------------------	---------------------------------	--

Puzzle 2

7 $2n = 20$	4 6 $5n - 1 = 4$	1 = 2 12 $3n = 6$	$2n = 18$ $5n + 2 = 62$
----------------	------------------------	-------------------------	----------------------------

9 $3n - 4 = n$	-2 $5 - 3n = 2$	$4 = n + n$ $3n - 1 = 5$	$5n + 1 = 9$ 2 $5 + 2n = 3$	-2 $2n + 5 = 11$ $5 - n = -1$
-1 3 $10 - 2n = 0$	2 3 $7 + n = 8$	1 5 $3n + 1 = 13$	4 1	

Fission Guide : page 305

Ch 16: The mega-challenge crossword !!

The answers to this crossword are the solutions to each of the equations. The clues include all the types of equations you have met PLUS SOME YOU WILL HAVE TO WORK OUT HOW TO SOLVE FOR YOURSELVES ! If you can complete this crossword without help from anyone else, then you are becoming a very competent mathematician indeed.

Stick this crossword into your book.

Section 9

Across

1. $x + 25 = 2(x - 50)$

3. $\frac{x}{x+4} = \frac{9}{10}$

5. $\frac{x}{66} = \frac{1}{3}$

6. $2(x - 3) - 25 = x + 22$

8. $\frac{2x-6}{5} = \frac{x+3}{3}$

9. $\frac{633}{x} + 15 = 18$

10. $3(x - 5) = 2(x + 5)$

11. $\frac{x}{11} + 5 = 15$

14. $\frac{100}{x-1} = 4$

16. $3(x - 22) = 2(x + 28) + 100$

18. $4(5y - 25) = 6y - 2$

19. $\frac{a-4}{6} = 5$

20. $3(50 - x) + x = 54$

22. $\frac{4(x+1)}{5} = 8$

23. $\frac{40}{x} = \frac{1}{21}$

Down

2. $2(x - 3) - (x + 2) = 15$

3. $\frac{x-7}{x-2} = \frac{5}{6}$

4. $\frac{x+119}{x-6} = 2$

6. $\frac{1}{6} \left(\frac{x}{3} + 1 \right) = 3$

7. $4(x - 65) - (2x - 35) = 15$

9. $4(x - 2) + 3 = 3x + 15$

12. $\frac{2x+1}{12} = \frac{35}{20}$

13. $\frac{40-d}{6} = \frac{4}{3}$

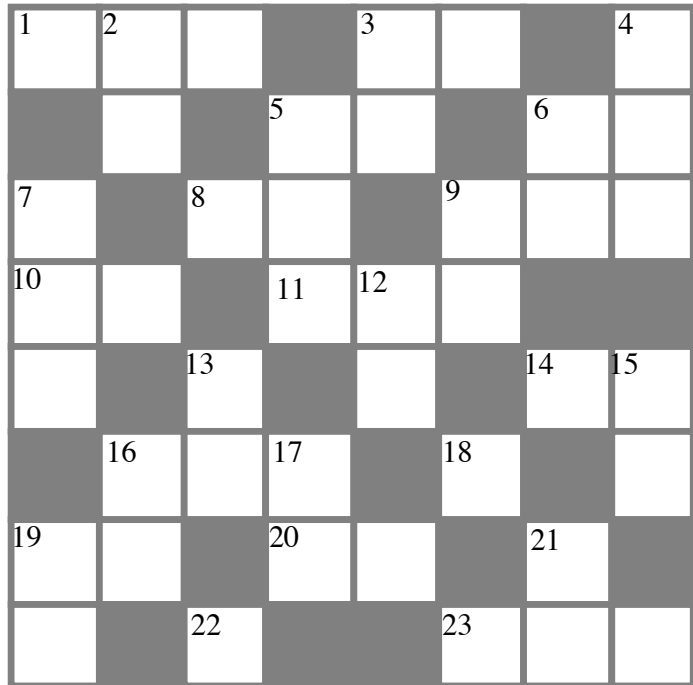
15. $\frac{3y}{4} + 2 = 50$

16. $\frac{40}{x} = \frac{5}{3}$

17. $\frac{x-4}{25} = \frac{4}{5}$

19. $\frac{3(p+3)}{4} = 30$

21. $15(100 - x) = x - 4$



42 squares = 4 stars
40-41 squares = 3 stars
35-39 stars = 2 stars
30-34 squares = 1 star

Skills in Algebra

Name :

End-of-topic Revision

Attempt all questions. WRITE THE ANSWERS ON THIS SHEET.

Only do the revision questions for the sections you have done.

LEVEL 5

Section 1:

1. Put in the missing numbers and rules in each of these chains:

Section 2:

1st expression	Value when N = 3	2nd expression
N^2	9	$3N$
$2(N+3)$
$N - 1$
$(N-1)(N+1)$
$(2N)^2$

(a) Put the value of each of the first expressions in the middle column.
 (b) For each expression in the first column:
 • choose an expression with the same value from the list below;
 • write the expression in the second column.

List to choose from: $N^2 - 1$ $4N^2$ $N(N-1)$

LEVEL 6

Section 3:

3. Find the solution to each equation:

$13 + t = 20$	$t = \dots$	$5 - w = 2$	$w = \dots$
$5 + 2c = 11$	$c = \dots$	$2(d + 1) = 10$	$d = \dots$
$3(2 + e) = 9$	$e = \dots$	$j + j = 10$	$j = \dots$
$4n - 1 = 7$	$n = \dots$	$6t = 30$	$t = \dots$
$5 - 2a = 1$	$a = \dots$	$n^2 - 1 = 15$	$n = \dots$

LEVEL 6

Section 4:

4. Solve these equations. You must show the working out.

$4n + 3 = 23$	$6p - 2 = 22$	$3d + 11 = 20$
$4p - 9 = 31$	$5r + 2 = 17$	$3m - 1 = 29$

5. Solve these equations. You must show the working out.

$3p + 7 = p + 19$	$5c - 3 = 2c + 9$	$4b - 3 = 22 - b$
-------------------	-------------------	-------------------

LEVEL 7

Section 5:

6. Solve these inequations:

$3r < 12$	$2u + 1 \geq 13$	$3p - 2 \leq 19$
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Skills in Algebra

Name :

Foundation Level %
Higher Level %

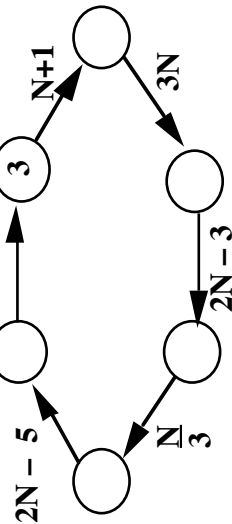
End-of-topic Assessment

Attempt all questions. Write the answers on this sheet.
The Foundation Level mark is the mark for the Foundation Section.
The Higher Level mark is the mark for both sections.

Foundation Section - Basic techniques

6 marks

LEVEL 5



- Complete the chain.
Put in the missing rule.

5 marks

- If $N = 4$, which five of these expressions have equal value ?

Put a ring around each of the five. (It might help to put in the value of each expression.)

- $3N - 2$ $6N$ $N^2 + 2$ $2N + 2$ $14 - N$
 $N^2 - 6$ $N^2 + 2$ $5(N - 1)$
 $2(N + 1)$ $\frac{N + 6}{2}$ $2(N + 3)$
 $\frac{4}{4}$

10 marks

LEVEL 6

- Find the solution of each equation:

$7 + k = 12$ $k = \dots\dots$ $3t - 1 = 8$ $t = \dots\dots$
 $9 - n = 3$ $n = \dots\dots$ $2p + 3 = 11$ $p = \dots\dots$
 $2y = 14$ $y = \dots\dots$

- Find the solution of each equation:

$m^2 + 1 = 10$ $m = \dots\dots$ $4 + 5t = 7t$ $t = \dots\dots$
 $\frac{18}{c} = 3$ $c = \dots\dots$ $\frac{24}{t + 1} = 4$ $t = \dots\dots$
 $\frac{d + 8}{d} = 3$ $d = \dots\dots$

10 marks

LEVEL 6

- Solve these equations. Marks are given for the working out.
You will lose marks if you just put down the answers.

10 marks

$3p - 1 = 14$	$2c + 3 = 11$	$5n - 3 = 22$
$7b + 4 = 18$	$3m - 5 = 25$	

- Solve these equations. Marks are given for the working out.
You will lose marks if you just put down the answers.

9 marks

$4p - 2 = 2p + 8$	$3c + 4 = 2c + 11$	$3a - 2 = 18 - 2a$
-------------------	--------------------	--------------------

Foundation Level Total = /50

Higher Section : More difficult questions

6 marks

- Solve these inequations.

$2c + 3 < 7$	$4p \leq -8$	$5m - 1 > -16$
--------------	--------------	----------------

8. Dave is y years old. Alan is two years older than him.
 Their mother is one year less than the sum of their ages. Mother is 47.
 Write an equation giving the mother's age in terms of y .
 Solve the equation. How old is Alan ?

Equation is

$y =$ Alan is

9. Solve these equations. Marks are given for the working out.
You will lose marks if you just put down the answers.

$$\frac{2d + 1}{3} = d - 1$$

$$\frac{x}{5} + \frac{x}{10} = \frac{x}{2} - 3$$

10. Solve these equations. Marks are given for the working out.
You will lose marks if you just put down the answers.

$$5(e - 2) = 50$$

$$2(3a - 2) = 4a + 2$$

11. Solve these equations. Marks are given for the working out.
You will lose marks if you just put down the answers.

$$\frac{2x - 3}{2} + \frac{x + 5}{4} = 6$$

$$7n - 2(n - 1) = 3n - 2$$

6 marks

4 marks

6 marks

5 marks
2,3

Higher Level Total = / 77

Skills in Algebra

End-of-topic Assessment ANSWERS

Attempt all questions. Write the answers on this sheet.

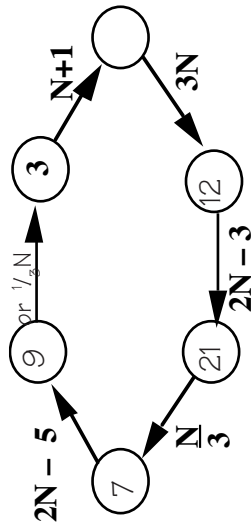
The Foundation Level mark is the mark for the Foundation Section.

The Higher Level mark is the mark for both sections.

Foundation Section - Basic techniques

LEVEL 5

$N-6$ or $N/3$



1. Complete the chain.
Put in the missing rule.

2. If $N = 4$, which five of these expressions have equal value?

Put a ring around each of the five. (It might help to put in the value of each expression.)

- $(3N - 2)$ $6N$ $(N^2 - 6)$ $N^2 + 2$ $5(N - 1)$
 $(2(N + 1))$ $(2N + 2)$ $(14 - N)$ $(N + 6)$ $2(N + 3)$
 2

LEVEL 6

3. Find the solution of each equation:

$7 + k = 12$ $k = \dots 5$ $3t - 1 = 8$ $t = \dots 3$
 $9 - n = 3$ $n = \dots 6$ $2p + 3 = 11$ $p = \dots 4$
 $2y = 14$ $y = \dots 7$

4. Find the solution of each equation:

$m^2 + 1 = 10$ $m = \dots 3$ $4 + 5t = 7t$ $t = \dots 5$
 $\frac{18}{c} = 3$ $c = \dots 6$ $\frac{24}{t+1} = 4$ $t = \dots 2$
 $\frac{d+8}{d} = 3$ $d = \dots 4$

6 marks

5 marks

10 marks

10 marks

LEVEL 6

5. Solve these equations. Marks are given for the working out. You will lose marks if you just put down the answers.

$3p - 1 = 14$
 $3p = 15$
 $p = 5$

$2c + 3 = 11$
 $2c = 8$
 $c = 4$

$5n - 3 = 22$
 $5n = 25$
 $n = 5$

$7b + 4 = 18$
 $7b = 14$
 $b = 2$

$3m - 5 = 25$
 $3m = 30$
 $m = 10$

6. Solve these equations. Marks are given for the working out. You will lose marks if you just put down the answers.

$4p - 2 = 2p + 8$
 $2p = 10$
 $p = 5$

$3c + 4 = 2c + 11$
 $c + 4 = 11$
 $c = 7$

$3a - 2 = 18 - 2a$
 $5a - 2 = 18$
 $5a = 20$
 $a = 4$

Foundation Level Total = 50

Higher Section : More difficult questions

7. Solve these inequations.

$2c + 3 < 7$
 $2c < 4$
 $c < 2$

$4p \leq -8$
 $p \leq -2$

$5m - 1 > -16$
 $5m > -15$
 $m > -3$

6 marks

8. Dave is y years old. Alan is two years older than him.
Their mother is one year less than the sum of their ages. Mother is 47.
Write an equation giving the mother's age in terms of y .
Solve the equation. How old is Alan?

4 marks

Equation is $y + y + 2 = 48$ or equivalent equation... (1 mark)

$$\begin{aligned} 2y + 2 &= 48 \\ 2y &= 46 \\ y &= 23 \end{aligned}$$

(1 mark for method, 1 for accuracy)

$y = \dots 23 \dots$ Alan is $\dots 25 \dots$ (1 mark)

9. Solve these equations. Marks are given for the working out.
You will lose marks if you just put down the answers.

6 marks

$$\begin{aligned} 2d + 1 &= d - 1 \\ 3 \end{aligned}$$

$$2d + 3 = 3d - 3$$

$$6 = d$$

$$d = 6$$

2 method
1 accuracy

$$\begin{aligned} \frac{x}{5} + \frac{x}{10} &= \frac{x}{2} - 3 \\ 2 \end{aligned}$$

$$2x + x = 5x - 30$$

$$30 = 2x$$

$$x = 15$$

2 method
1 accuracy

10. Solve these equations. Marks are given for the working out.
You will lose marks if you just put down the answers.

5 marks

$$5(e - 2) = 50$$

$$5e - 10 = 50$$

$$5e = 60$$

$$e = 12$$

2 method
1 accuracy

$$2(3a - 2) = 4a + 2$$

$$6a - 4 = 4a + 2$$

$$2a = 6$$

$$a = 3$$

2 method
1 accuracy

11. Solve these equations. Marks are given for the working out.
You will lose marks if you just put down the answers.

6 marks

$$\frac{2x - 3}{2} + \frac{x + 5}{4} = 6$$

$$4x - 6 + x + 5 = 24$$

$$5x - 1 = 24$$

$$5x = 25$$

$$x = 5$$

2 method
1 accuracy

$$7n - 2(n - 1) = 3n - 2$$

$$7n - 2n + 2 = 3n - 2$$

$$5n + 2 = 3n - 2$$

$$2n = -4$$

$$n = -2$$

2 method
1 accuracy

Higher Level Total = / 77

Skills in Algebra

Date Name.....

I can do the following :

- Level 5
 - Q1 use algebraic rules
 - Q2 put numbers in algebraic expressions
- Level 6
 - Q3 solve simple equations
 - Q4 solve more difficult equations
 - Q5 solve simple equations systematically
 - Q6 solve equations with letters on both sides
- Level 7
 - Q7 solve inequalities
 - Q8 solve problems using algebra
 - Q9 solve equations with fractions
 - Q10 solve equations with brackets

The things I enjoyed most were

I would like more practice on.....

Pupil's comment (optional).....

Teacher's comment (optional)

Assessment

Parent's comment (optional)

Signature of teacher..... Signature of parent.....

Skills in Algebra

Date Name.....

I can do the following :

- Level 5
 - Q1 use algebraic rules
 - Q2 put numbers in algebraic expressions
- Level 6
 - Q3 solve simple equations
 - Q4 solve more difficult equations
 - Q5 solve simple equations systematically
 - Q6 solve equations with letters on both sides
- Level 7
 - Q7 solve inequalities
 - Q8 solve problems using algebra
 - Q9 solve equations with fractions
 - Q10 solve equations with brackets

The things I enjoyed most were

I would like more practice on.....

Pupil's comment (optional).....

Teacher's comment (optional)

Assessment

Parent's comment (optional)

Signature of teacher..... Signature of parent.....

Suggested Modifications to Y8 Fission and Y8 Chypts to satisfy the Mathematics Framework

The worksheets attached are suitable for students working with both Fission and Chypts.

Worksheet	Suggested point of use	No. of A4 pages	Page(s) in pack
1: Division and Remainders as fractions (2 sections)	These two <i>essential</i> sections can be done anytime. Two possible places are at the end of Number Handling 1 or Number Handling 2	3	2-4
2: Efficient use of a calculator	Number Handling 1 : after Section 7	1	5
3: Very large numbers	Number Handling 2 : after Section 1	2	6-7
4: Midpoints	WLDN 2 : after Section 5	1	8
5: Some new diagrams (two-way tables and scatter graphs)	Working with Data: after Section 2	1	9
6: Stem-and-leaf diagrams	Working with Data: after Section 11	1	10
7: Adding and subtracting fractions	Fractions, Decimals, % 1: after Section 4	1	11
8: Ordering decimals and fractions	Fractions, Decimals, % 1: after Section 6	1	12
9: Decimal arithmetic	Fractions, Decimals, % 1: after Section 8	3	13-15
10: Percentages with a calculator	Fractions, Decimals, % 2: after Section 4	1	16
11: Scales, plans & elevations	Measurement & Estimation: after Section 11	1	17
Answers to worksheets			18-19
Answers to Star Challenges			20

Worksheet 1: Division (Two sections)

Section 1: Division techniques

DEVELOPMENT

READ THIS FIRST: Very Important Note on Division Techniques

Students sometimes state that they "can't do division". By this they mean that they cannot understand the division techniques that they have been taught. When they realise that division of a number by 5, say, just means "how many 5s are there in that number?", division suddenly becomes accessible. The techniques developed below are just ways of finding out the answers to questions like "how many 5s are there in that number?".

Below are the four stages required to develop competence at using the standard method of division (short division). Being able to do short division is the goal because it is the quickest method. But, provided each student can work with any of the methods in 16.2-16.4, they can do division problems. *Sureshot*



D1.1: Division in disguise

How many ...

1. ...5s are there in 20 ?
 2. ...3s are there in 10 ?
 3. ...6s are there in 18 ?
 4. ...3s are there in 17 ?
 5. ...4s are there in 25 ?
 6. ...9s are there in 27 ?
- Division questions can be asked in several ways.
7. How many 6s are there in 42 ?
 8. $21 \div 7$
 9. Divide 20 by 4
 10. 12 divided by 6
 11. Share £15 equally between 5 people

• Check your answers.

D1.2: Division using 'chunking'

EXAMPLE Estimate how many 8s there are in 257.

Then work out $257 \div 8$ using 'chunking'.

Estimate: $20 \times 8 = 160$

$30 \times 8 = 240$ which is a little less than 257

So there are just over thirty 8s in 257

$$8 \ 2 \ 5 \ 7$$

$$- \ 2 \ 4 \ 0 \ \leftarrow 30 \times 8$$

$$1 \ 7$$

$$- \ 1 \ 6 \ \leftarrow 2 \times 8$$

$$1$$

$$\text{So, } 257 \div 8 = \boxed{32 \text{ rem } 1}$$

Estimate and then work out using the 'chunking' method:

1. $95 \div 7$
2. $284 \div 5$
3. $739 \div 8$
4. $582 \div 13$

• Check your answers.

WORKSHEET 1

D1.3: Systematic chunking

In the 'chunking' method, each student chooses what 'chunks' to take away each time.

Here we move onto a systematic way of doing it.
The aim is to do it using as few chunks as possible.

EXAMPLE Work out $345 \div 9$

$3 \ 8 \leftarrow$ ANSWER

$$9 \ 3 \ 4 \ 5$$

$$- \ 2 \ 7 \ 0 \ \leftarrow 30 \times 9$$

$$7 \ 5$$

$$- \ 7 \ 2 \ \leftarrow 8 \times 9$$

$$3$$

$$\text{So } 345 \div 9 = \boxed{38 \text{ rem } 3}$$

Step 1: We need to multiply 9 by the largest multiple of 10 (10, 20, 30, ...) that will give an answer just below 345.
 $30 \times 9 = 270$
 $40 \times 9 = 360$ (too big)

[So, we take away 30 lots of 9 and put 3 into the tens column of the answer.]

Step 2: Now we need to multiply 9 by the largest unit (1, 2, 3 ...) that will give an answer just below 75.

$$8 \times 9 = 72$$

$$9 \times 9 = 81$$
 (too big)

[So, we take away 8 lots of 9 and put 8 into the units column of the answer.]

Work out using the 'systematic chunking' method:

1. $397 \div 7$
2. $488 \div 6$
3. $822 \div 9$
4. $581 \div 12$
5. $417 \div 8$
6. $765 \div 13$
7. $713 \div 23$
8. $603 \div 4$

• Check your answers.

As division has frequently been a stumbling block with students, it is worth spending the time on developing the techniques here thoroughly, step-by-step. Students should only move onto the standard method, when they can confidently do 'systematic chunking'.

FURTHER PRACTICE is supplied, for use with any of these techniques, on the next page.



Driller

D1.4: The standard method of division (short division)

EXAMPLE Work out $345 \div 9$ using 'short division'

$$3 \ 8 \text{ rem } 3$$

$$9 \ 3 \ 4 \ 5$$

$30 \times 9 = 270$ (we put 3 into the tens column of the answer)

$340 - 270 = 70$ (we put 7 next to the 5 in the units column to show that 75 is left)

$8 \times 9 = 72$ (we put 8 in the units column of the answer)

$75 - 72 = 3 = \text{remainder}$

Work out using the standard method:

1. $293 \div 4$
2. $346 \div 5$
3. $281 \div 7$
4. $455 \div 6$
5. $213 \div 8$
6. $622 \div 8$
7. $489 \div 9$
8. $925 \div 7$

• Check your answers.

D1.5: Division by a 2-digit number

EXAMPLE Work out $554 \div 23$

Using the 'systematic chunking' method

$$\begin{array}{r} 24 \leftarrow \text{ANSWER} \\ 23 \overline{) 554} \end{array}$$

Using the standard method

$$\begin{array}{r} 24 \text{ rem } 2 \\ 23 \overline{) 554} \end{array}$$

$$- \underline{460} \leftarrow 20 \times 23$$

$$94$$

$$- \underline{92} \leftarrow 4 \times 23$$

$$2$$

So $554 \div 23 = 24 \text{ rem } 2$

$$20 \times 23 = 460$$

$$30 \times 23 = 690 \text{ (too big)}$$

$$4 \times 23 = 92$$

$$5 \times 23 = 115 \text{ (too big)}$$



Sureshot

Division by a 2-digit number can be done using either of these methods.

Students who can use either of these methods confidently and competently, can use either method to divide by a 2-digit number AND divide decimals (in the following section).

Work out using either method:

- $567 \div 23$
- $792 \div 35$
- $916 \div 19$
- $629 \div 37$

• Check your answers.

Star Challenge

Single digit division

Work out, using 'chunking' or the standard method.

- $351 \div 6$
- $288 \div 9$
- $179 \div 7$
- $652 \div 8$
- $539 \div 7$
- $871 \div 4$
- $409 \div 9$
- $915 \div 4$
- $386 \div 5$
- $777 \div 6$
- $876 \div 8$
- $1123 \div 9$

• Your teacher has the answers to these.

Star Challenge

Just how good is your division ?

10-12 correct = 3 stars
7-9 correct = 2 stars
4-6 correct = 1 star

Good ?

Work out, showing your working clearly: Fission

- $197 \div 8$
- $643 \div 5$
- $455 \div 3$
- $315 \div 9$

Very good ?

Work out, showing your working clearly: Chyps

- $342 \div 11$
- $726 \div 7$
- $947 \div 8$
- $829 \div 13$

Excellent ?

Work out, showing your working clearly: Lubbly

- $658 \div 26$
- $778 \div 37$
- $820 \div 43$
- $1426 \div 48$

• Your teacher has the answers to these.

WORKSHEET 1

Section 2: Remainders as fractions

In this section you will:

- divide using related number facts
- divide whole numbers giving the remainders as fractions
- solve division problems in context

DEVELOPMENT

D2.1: Division using related number facts

EXAMPLE $56 \div 7 = ?$

$$56 \div 7 = ?$$

This means

'How many 7s in 56?'



Ruff

We know that $8 \times 7 = 56$

$$8 \times 7 = 56$$

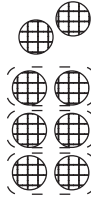
Work out :

- $20 \div 5$
- $35 \div 5$
- $28 \div 7$
- $27 \div 9$
- $63 \div 7$
- $54 \div 9$
- $42 \div 7$
- $150 \div 50$
- $125 \div 25$
- $39 \div 13$
- $650 \div 50$
- $55 \div 5$
- $48 \div 8$
- $72 \div 9$
- $250 \div 50$

• Check your answers.

D2.2: Sharing problems

EXAMPLE Share 8 pizzas among 3 people. How much does each person get ?
Give your answer as a mixed number (whole number and fraction).



Each person gets 2 whole pizzas

plus $2 \times \frac{1}{3}$ of a pizza.

Answer: $2 \frac{2}{3}$

Each pizza left over is divided into 3.

Each person gets $\frac{1}{3}$ of it.

Work out how much each person gets when you share:

- 5 pizzas among 2 people
- 9 pizzas among 4 people
- 10 pizzas among 3 people
- 11 pizzas among 3 people
- 7 pizzas among 4 people

• Check your answers.

D2.3: Dividing whole numbers with fraction answers

page 3 (of 3 pages)

EXAMPLE $7 \div 3 = ?$

(2 with 1 left over)



How many 3s are there in 7? So, we divide the one left over by 3, to give $\frac{1}{3}$

$$7 \div 3 = 2\frac{1}{3}$$

Ruff

Work out each division.

Give each answer as a mixed number (whole number + fraction)

- $5 \div 2$
- $9 \div 2$
- $10 \div 3$
- $22 \div 3$
- $16 \div 5$
- $19 \div 6$
- $50 \div 7$
- $11 \div 3$
- $27 \div 5$
- $23 \div 7$

Star Challenge

• Check your answers.

14-15 correct = 2 stars
10-13 correct = 1 star

Dividing whole numbers with fraction answers.

Give each answer as a mixed number (whole number + fraction)

- $7 \div 2$
- $21 \div 2$
- $4 \div 3$
- $11 \div 3$
- $18 \div 5$
- $25 \div 6$
- $36 \div 7$
- $13 \div 6$
- $23 \div 5$
- $20 \div 9$
- $18 \div 7$
- $14 \div 3$
- $21 \div 10$
- $39 \div 5$
- $11 \div 4$

Star Challenge

• Your teacher has the answers to these.

8 correct = 2 stars
6-7 correct = 1 star

Dividing in context

Give a sensible answer to each of these problems.

- 37 Smarties are shared between 7 children.
How many do they each get and how many are left over?
- 7 bars of chocolate are shared equally between 3 children.
How much does each child get?
- There are five players in a basketball team.
How many complete teams can be made with 27 players?
- 27 basketball players are to go by taxi to the station.
A taxi cannot hold more than 5 passengers.
How many taxis must be ordered?
- An egg box holds 6 eggs. On Monday, I collect 25 eggs from my hens.
How many egg boxes can I fill?
- An egg box holds six eggs. On Tuesday, I collect 38 eggs.
How many egg boxes do I need to take them all?
- Cars are placed bumper to bumper on the deck of a car ferry.
The car deck is 37 m long.
How many 3 m long cars could fit in one line on the ferry?
- 36 children are being taken to the zoo. 5 adults are going to supervise the children.
How many children should each adult supervise?

• Your teacher has the answers to these.

Worksheet 2: Efficient use of a calculator

1 A4 page only

In this section you will:

- work with brackets on a calculator
- use the memory on a calculator



scientific

DEVELOPMENT

D1.1: Using brackets on a calculator

Things you ought to know

A: Brackets tell the calculator to work out what is inside the bracket first.

B: $2 \times (2 + 1) =$ When you press the = key, the calculator works out the value of the whole calculation as far as this point.

When you press the second bracket key, the calculator works out the value of the bracket.

C: The calculator operates the BIDMAS rules automatically.

Use the bracket keys to work out each of the following.

The numbers are kept simple so you can see what is happening.

The answer is given in the box.

If you cannot get the given answer, ask your teacher for help.

No written answers required.

- $3(10 - 4)$ 7
- $10 - \sqrt{7 + 2}$ 400
- $(2^2 + 3^2)^2$ 4
- $(3 + 2)^2 \times 4^2$ 54
- $100 \div (3 + 2)^2$ 6
- $(5 - 2 \times 3)^2$ 41
- $(4 + 2) \times 3^2$ 6
- $5 + (2 \times 3)^2$ 6

9. Try $2(5 - 2)$ and $2 \times (5 - 2)$ on the calculator.

You should get the same answer : 6

10. If an expression has a set of brackets inside another set of brackets, it is usual to write the expression with two different sets of brackets.

However, on a calculator, there is only one kind of bracket - but it can be used more than once.

Try $23 - [4 + (9 - 5)]$ on your calculator. You should get the value 15.

If you don't get 15, ask your teacher for help.

11. Work out $3[5 + (4 - 2)^2]$. You should get the value 27.

Now try some with decimals – and without given answers.

Write down each answer to 2 decimal places.

- $12.3^3 - (4.15 + 2.3)$
- $(2.1^2 + 2.5^2)^2 \times 2$
- $19.27 \div (3.7^2 + 2.95)$
- $(6.785 - 1.27)^3 + 15.1$
- $(5.75^2 - 1.5^4) \times 5.11$
- $24 + \sqrt{(7.9 + 3.28)}$
- $4[3.4^2 - (12.5 \div 4.85)]$
- $15.95 \div (2.74 + 3.95)$
- $[(5.67 - 3.68)^2 + 2.1]^2$

• Check your answers.

WORKSHEET 2

Supplementary worksheets for Y8 Fission and Chyps

page 5

WORKSHEET 2

D1.2: Using the memory on a calculator

M in or STO puts the value into the memory

MR or REC or RCL recalls the value from the memory

Putting a value into the memory automatically clears any previous value.

$\frac{5+4}{2+2.5}$ is worked out in three stages

$2 + 2.5 =$ [This calculates the bottom line and puts this value into the memory]

$5 + 4 =$ [This calculates the top line]

\div [This divides the value of the top line by the value in the memory]

Using the memory means you don't have to put part answers on paper as you go along.

All three stages are done in one set of key strokes:

$2 + 2.5 =$ STO 5 + 4 = \div RCL =

- Use the instructions just given to work out the value of $\frac{6+5}{3+2.5}$

on your calculator. You should get the answer 2.

When the = key is pressed, the calculator does the calculation up to that point.

Use the memory to work out each of the following.

The numbers are kept simple so you can see what is happening.

The answer is given in the box.

If you cannot get the given answer, ask your teacher for help.

No written answers required.

- $\frac{40}{6+4}$ 4
- 8×5 4
- $8 + 2$ 4
- $\frac{320}{9^2 - 1}$ 4

Now try some with decimals – and without given answers.

Write down each answer to 2 decimal places.

- 35.47 4
- $16.8 + 13.36$ 4
- $11.23 - 3.4$ 4
- 2.74×3.8 4
- 11.4^2 4
- $6.35 + 1.7^2$ 4

You can use the memory instead of using a bracket.

Work out the value inside the bracket and put it into the memory.

Then do the calculation but when you get to the bracket, RECALL the memory.

Use the memory (and no brackets) to work out each of the following.

The answer is given in the box.

No written answers required.

- $2 \times (15 - 4)$ 22
- $24 \div (4 + 2)$ 4
- $10.10 + (5 - 2)^2$ 19

• Check your answers.

Worksheet 3: Very large numbers

In this section you will:

- read and write very large numbers
- work with large numbers involving fractions and decimals
- round large numbers

DEVELOPMENT

D1.1: Reading and writing large numbers

Then you can read much bigger numbers. You just need to know the pattern.

There are two ways of writing big numbers:

2 396 471 (gaps every 3 digits) or (commas every 3 digits) 3,672,642

↑ million thousand ↑ million thousand
 2 million 396 thousand 471 3 million 672 thousand 642

Where the commas/gaps are you say "million" or "thousand"

How would you read :

1. 34,025
2. 321,760
3. 3 476 000
4. 250 000
5. £3,000
6. £40,000
7. £500 000
8. £6 000 000

Extremely big numbers : millions and billions

1 million = 1 thousand thousands = 1,000,000
 1 billion = 1 thousand millions = 1,000,000,000

3,500,000 = 3 million 500 thousand
 ↑ million thousand
 2,700,000,000 = 2 billion 7 hundred million
 ↑ billion million thousand

How would you read :

9. £8,000,000
10. £3,000,000,000
11. £6 400 000
12. \$2,300,000,000
13. \$500 000 000
14. \$16,035,000,000

Write in figures:

15. 5 million
16. 3 million 70 thousand
17. 15 million 3 thousand
18. 7 billion
19. 4 billion 300 million
20. 2 billion 50 million
21. First man appeared on Earth about 4 million years ago.

Write this number in figures.

22. Earth is approximately 93,000,000 miles from the Sun.

Write this number in words.

23. The estimated age of the Universe is 14 billion years.

Write this number in figures.

- Check your answers.

WORKSHEET 3

D1.2: Fractions of millions and billions

1,000,000 = 1 million
 500,000 = 1/2 million
 So, 2,500,000 can be read as 2 1/2 million

1. 500,000 = half a million

What fraction of a million is (a) 250,000 (b) 750,000 ?

2. Write in figures:

- (a) 3 1/2 million (b) 1 1/4 million (c) 2 3/4 million

3. 2,500,000 can be read as 2 1/2 million

In the same way, how would you read:

- (a) £7,500,000 (b) £3,250,000

1,000,000,000 = 1 billion
 500,000,000 = 1/2 billion

4. What fraction of a billion is (a) 250,000,000 (b) 750,000,000 ?

5. Write in figures:

- (a) 7 1/2 billion (b) 6 1/4 billion (c) 3 3/4 billion

- Check your answers.

D1.3: Using decimal notation for millions and billions

1 million = 1,000,000 3 billion = 3,000,000,000
 1.2 million = 1,200,000 3.5 billion = 3,500,000,000

1. Write in figures:

- (a) 2.5 million (b) 1.7 million (c) 3.1 billion (d) 1.6 billion

2. Write 4 1/2 million (a) in figures (b) using decimal notation

3. Just before the National Lottery Draw, it was announced that the Lottery Jackpot was 9.1 million pounds.

Write this number in figures.

4. The largest city in the world is Mexico City, with an approximate population of 21.5 million.

Write this number in figures.

5. Saturn is the sixth planet from the Sun. Its mean distance from the Sun is 1,417,760,000 miles.

Write this number in words.

6. The Dog Star (Sirius) is the brightest star that can be seen with the naked eye. Its diameter is 2 330 000 km.

Write this number in words.

- Check your answers.

D1.4: Rounding very large numbers

page 2 (of 2 pages)

EXAMPLE Round 42,829,668 to the nearest (a) million (b) ten thousand
 (a) 42,829,668 \approx 43,000,000 or 43 million (to the nearest million)
 (b) 42,829,668 \approx 42,830,000 (to the nearest ten thousand)

- Round 13,994 to the nearest (a) ten (b) hundred (c) thousand
- Round 786,482 to the nearest (a) ten thousand (b) 100 thousand
- Round 1,089,403 to the nearest (a) thousand (b) 10 thousand (c) 100 thousand
- Round 6 878 632 to the nearest (a) million (b) thousand (c) ten thousand (d) hundred thousand
- Round 3 571 240 000 to the nearest (a) billion (b) million (c) 100 million
- The speed of light is 299 792 km/s.
Write this to the nearest (a) 100 km/s (b) hundred thousand km/s (c) ten thousand km/s (d) thousand km/s

• Check your answers.

Star Challenge 3A3A

Matching words and figures

Match each number with the correct words.

Write each answer in the form $A = P$

- | | |
|------------------|--------------------------------------|
| A: 4 500 | P: four thousand five hundred |
| B: 450 000 | Q: forty five million |
| C: 4 500 000 | R: four hundred and fifty thousand |
| D: 4 500 000 000 | S: $4\frac{1}{2}$ million |
| E: 45 000 000 | T: 4.5 billion |
| F: 23 000 | U: two billion three hundred million |
| G: 203 000 | V: two million thirty thousand |
| H: 2 300 000 | W: 2.3 million |
| I: 2 030 000 | X: twenty three thousand |
| J: 2 300 000 000 | Y: two hundred and three thousand |

• Your teacher has the answers to these.

All correct = 2 stars
7-6 correct = 1 star

Star Challenge 3B

Challenging large numbers

- Dinosaurs became extinct around one hundred million years ago.
Write this number in figures.
 - Around 8.3 million soldiers died in World War I (1914-1918).
Write this number in figures.
 - Round 3 567 020 to the nearest (a) million (b) thousand
 - Round 17 386 700 000 to the nearest (a) billion (b) million
- Your teacher has the answers to these.

5-6 correct = 1 star

Worksheet 4: Midpoints

In this section you will:

- review working with coordinates in all four quadrants
- find midpoints of line segments using a formula

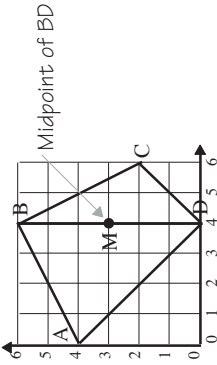
DEVELOPMENT

D1.1: Midpoints of line segments

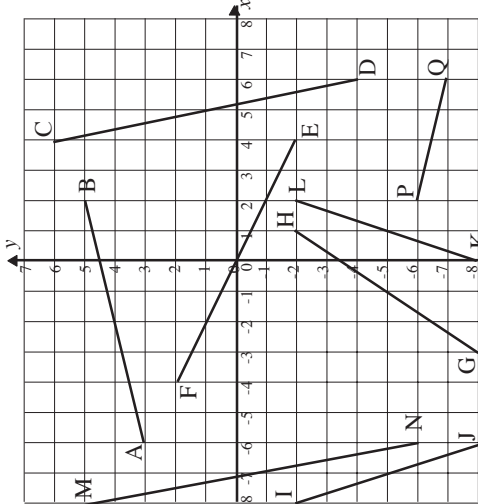
In a set of coordinates:

- the first number tells you how far ACROSS to go
- the second number tells you how far UP to go

- The midpoint of the line segment BD is M. The coordinates of this midpoint are (4,3). State the coordinates of the midpoints of these line segments:
 (a) AB (b) BC (c) CD (d) AD



- For each line segment in the second diagram, state the coordinates of:
 - both endpoints
 - the midpoint

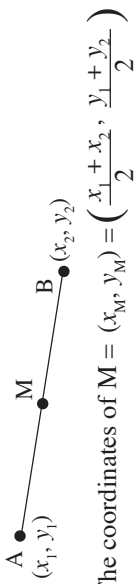


- Find the midpoints of:
 - RS where R is (5, 2) and S is (7, -4)
 - TU where T is (0,-5) and U is (-5, 5)
 - VW where V is (-2,4) and W is (4,-6)



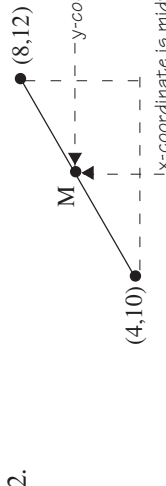
• Check your answers.

D1.2: The midpoint formula



- (a) What number is midway between 4 and 8 ?
 (b) If $x_1 = 4$ and $x_2 = 8$ then $\frac{x_1 + x_2}{2} = \frac{4 + 8}{2} = \square$
 What number goes in the box ?

Q: Why does $\frac{4 + 8}{2}$ give the number midway between 4 and 8 ?
 A: Because $\frac{4 + 8}{2}$ is the mean average of 4 and 8.



- Work out the coordinates of M, using the diagram.
- Work out the coordinates of M, using the formula.

Use the formula to work out the midpoint of the line segment connecting each pair of points.

- X(7,3) & Y(15,9)
- P(3, -8) & Q(11, 8)
- E(-3, -6) & F(5,2)
- R(-1, -4) & S(5, -8)
- B(2.5,1.7) & C(1.3,2.1)
- U(-50, 20) & V(30, 0)

• Check your answers.

Star Challenge 4A

All correct = 1 star

Flower power

Draw a set of coordinate axes from -8 to 8 along each axis.

- Plot and join: (1,3) (2,2) (0,-6) (1,-7) (2,-6) (0,2) (1,3)
 Plot and join: (5,2) (5,1) (-3,-5) (-3,-6) (-2,-6) (4,2) (5,2)
 Plot and join: (-3,2) (-2,2) (4,-6) (5,-6) (5,-5) (-3,1) (-3,2)
 Plot and join: (-4,-2) (-3,-1) (5,-3) (6,-2) (5,-1) (-3,-3) (-4,-2)

• Your teacher has the answers to this.

Worksheet 5: Some new diagrams

1 A4 page only

In this section you will:

- meet and work with two-way tables
- meet and work with scatter graphs

DEVELOPMENT

D1.1: Two way tables

Time after waking first cigarette smoked	Number of cigarettes smoked per day		
	20 or more	10-19	0-9
Less than 5 minutes	31%	12%	2%
5-14 minutes	28%	16%	3%
15-29 minutes	19%	17%	6%
30-59 minutes	14%	23%	12%
1 hr – 1 hr 59 min	6%	18%	15%
2 hours or more	2%	15%	63%

Source: Smoking Statistics: who smokes and how much, ASH

1. Which group starts smoking earliest after they wake ?
 2. One group smokes mostly socially, in the evening. Which group do you think this is ?
 3. Of those who smoke 20 or more per day, what percentage have lit up within one hour of waking ?
 4. Of those who smoke less than 10 per day, what percentage have lit up within one hour of waking ?
 5. The figures in the 20 or more column add up to 100%. The other two columns each add up to 10%. Which of these do you think is the reason why ?
- A: There are 101 people in each of these two groups.
B: There are rounding errors in some, or all, of the figures given here.

• Check your answers.

Star Challenge 5A

All correct = 1 star

Design two-way tables

1. Design a two-way table to be used in a car park survey to record both the makes and colours of vehicles.
2. Design a two-way table to record GCSE results (the numbers of students who got A*,A,B,C,D,E,F,G) for both Y11 boys and girls.

• Show your tables to your teacher.

WORKSHEET 5

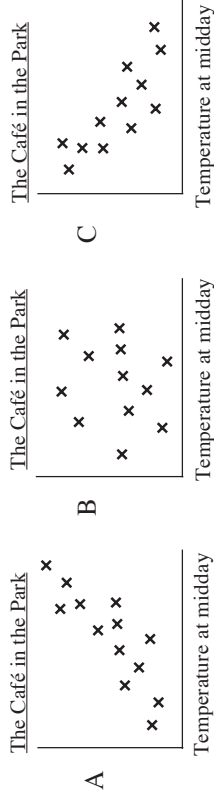
Supplementary worksheets for Y8 Fission and Chyps

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WORKSHEET 5

D1.2: Meet the scatter graph

In a scatter graph, two variables are plotted on a graph. We then look to see if there is any relationship between the two variables.



The Café in the Park kept a record of the midday temperature each day. They also kept a record of how many icecreams, packets of crisps and hot drinks they sold each day. They plotted three scatter graphs of the data collected (shown here).

The three labels that should go on the vertical axes are:

- number of icecreams sold
- number of hot drinks sold
- number of packets of crisps sold

Your task:

Decide which label goes on which graph. Explain why you think it should go there.

• Check your answers.

If one variable plotted against the other shows an upward trend, we say that the variables have a positive correlation.
If one variable plotted against the other shows a downward trend, we say that the variables have a negative correlation.
If no trend can be seen, we say that there is no correlation between the variables.

Star Challenge 5B-5B

Is there a relationship ?

8 marks = 2 stars
6-7 marks = 1 star

distance (in km) from centre of city	0.8	3.7	1.6	4.1	2.9	2.5	0.9	2.3
number of people per hectare	52	16	48	15	12	28	46	24

1. Draw a scatter graph for this data. [5 marks]
2. What kind of correlation do you get ? [1 mark]
3. Describe simply any relationship between the number of people per hectare and the distance from the centre of the city. [2 marks]

• Your teacher will need to mark this.

Worksheet 6: Stem-and-leaf diagrams

A **stem-and-leaf diagram** is a way of organising ungrouped data to show up any patterns. An ordered stem-and-leaf diagram is easy to use to find the median.

EXAMPLE The ages of the fathers of fifteen Y8 students are:

37 42 33 60 52 41 39 42 43 47 50 37 42 54 36

(a) Put this data onto a stem-and-leaf diagram which is

(i) unordered (ii) ordered

(b) Find the median age of the fathers. (c) Find the range of ages.

(a) (i) Unordered stem-and-leaf diagram

Ages of fathers of Y8 students 3|7 means 37 years ← (key)

3 7 3 9 7 6 (5)
 4 2 1 2 3 7 2 (6)
 5 2 0 4 (3)
 6 0 (1)

(The numbers in brackets tell us how many leaves belong to each stem. It is not essential to have them, but they are often useful. Their total provides a check that no data value has been missed out.)

↑ stem leaves

(ii) Ordered stem-and-leaf diagram

Ages of fathers of Y8 students 3|7 means 37 years

3 3 6 7 7 9 (5)
 4 1 2 2 2 3 7 (6)
 5 0 2 4 (3)
 6 0 (1)

(To make an ordered stem-and-leaf diagram, it is usually easier to make an unordered one first.)

(b) The median age is the age of the 8th father

There are 15 fathers. When in order, the middle one is the 8th. median = 42

1. The ages of the mothers of the fifteen Y8 students are:

36 43 39 53 49 38 37 42 34 46 51 37 44 42 34

(a) Construct an ordered stem-and-leaf diagram, complete with a key for this data.

(b) Find the median age of the mothers.

(c) Find the range of ages.

(d) There are three modes. What are they?

2. The lengths of feet, in cm, of a group of Y8 girls are:

23.1 24.3 26.6 27.1 22.9 25.8 23.8 24.7 26.9 25.2
 22.8 23.4 25.3 26.1 27.0 22.9 26.4 23.3 24.7 25.6
 24.0 22.6 25.8 25.4 23.9 24.9 26.4 26.7 24.2

(a) Using a key where 22|7 means 22.7, construct an ordered stem-and-leaf diagram for this data.

(b) How many lengths were less than 25 cm?

(c) How many lengths were over 26 cm (shoe size 6)?

(d) Find the median and the range of this data.

• Check your answers.

Stem-and-leaf diagrams have the clarity of the shape of a bar chart plus the detail of the original data.

Their stems may have more than one digit BUT their leaves can have only one digit.

Star Challenge 6A 6A

14 marks = 2 stars
 10-13 marks = 1 star

1. The number of days that patients have waited for a first appointment with an eye consultant at Barley Mow Hospital is shown on this stem-and-leaf diagram:

Number of days		Key 4 2 = 42
1	0 1 2 4	(4)
2	0 1 5 7 9	(5)
3	1 4 6 8 8	(5)
4	0 1 2 2 3 5 7 8 9	(9)
5	2 4 5 8 9 9	(6)
6	1 4 5	(3)
7	1 2	(2)

(a) A doctor wants to give his patient an estimate of how long they are likely to have to wait for an appointment. **What estimate would you give?** [2 marks]

(b) **Work out the median wait and the range of waiting times.** [2 marks]

Direct comparison of two sets of data can be achieved by placing two stem-and-leaf diagrams back-to-back.

2. This back to back stem-and-leaf diagram shows the test marks for two Y8 tests.

Geometry Test	End-of-Year Test	Key 40 = 40%
(0)	3 5	(1)
(0)	4 2	(1)
(3)	7 4 2 5 5 9 9	(3)
(5)	7 7 5 2 6 2 4 5 6 6 8 9	(8)
(5)	9 7 5 5 4 7 1 2 5 6 7 8 9 9	(9)
(8)	8 7 6 4 2 1 0 8 0 0 1 2 6 7	(6)
(7)	7 5 4 4 1 1 0 9 3 5 6	(3)

(a) What was the lowest mark? [1 mark]

(b) What was the highest mark? [1 mark]

(c) Which test was easier? Explain how you can tell. [2 marks]

(d) How many students took each test? [2 marks]

(e) Work out the median mark for each test. [2 marks]

(f) On the end-of-year test, students getting over 85% got an award.

How many were given the award? [2 marks]

• Your teacher has the answers to these.

Star Challenge 6B 6B

12 marks = 2 stars
 9-11 marks = 1 star

1. Combine the ages of fathers and mothers of Y8 students in a back to back stem-and-leaf diagram. (Data in Example and Q1 of D5.2) [10 marks]

2. Compare the ages of the fathers and the mothers. [2 marks]

What do you notice?

• Your teacher has the answers to these.

Worksheet 7: + & - fractions

1 A4 page only

In this section you will:

- review adding and subtracting fractions with the same denominator
- use equivalent fractions to add and subtract any fractions

DEVELOPMENT

D1.1: + and - fractions with the same denominator

$$\frac{3}{7} + \frac{5}{7} = \frac{8}{7} = 1\frac{1}{7} \quad \frac{5}{9} + \frac{1}{9} = \frac{6}{9} = \frac{2}{3}$$

When the denominators are the same, you just add or subtract the numerators.

Answers should be given in simplest form.

Improper fractions should be changed to mixed numbers.

Evaluate, showing all working clearly:

- $\frac{1}{5} + \frac{2}{5}$
- $\frac{4}{7} + \frac{4}{7}$
- $\frac{7}{8} - \frac{5}{8}$
- $\frac{7}{8} + \frac{3}{8}$
- $\frac{2}{9} + \frac{3}{9}$
- $\frac{7}{10} - \frac{3}{10}$
- $\frac{7}{15} - \frac{2}{15}$
- $\frac{5}{6} + \frac{1}{6}$
- $\frac{4}{15} + \frac{13}{15}$
- $\frac{7}{12} + \frac{3}{12} - \frac{5}{12}$
- $\frac{5}{8} + \frac{5}{8} - \frac{3}{8}$

• Check your answers.

In order to fit more questions on the page, fractions will often be printed in the form $\frac{2}{3}$. However, if you are doing calculations with fractions, you will find it easier, and clearer, if you write fractions using two lines (as in the examples).

D1.2: + and - proper fractions

$$\begin{aligned} \text{EXAMPLE} \quad \frac{1}{2} + \frac{5}{7} &= \frac{7}{14} + \frac{10}{14} \\ &= \frac{17}{14} \\ &= 1\frac{3}{14} \end{aligned}$$

Step 1: Change the fractions so that they have the same denominators.

[Use the lowest common multiple as the denominator. Here the LCM is 14]

Step 2: Add/subtract the numerators.

Step 3: Give answer in simplest form and/or as mixed numbers, rather than improper fractions.

Evaluate and show all your working out. Give all answers in simplest form.

- $\frac{1}{2} + \frac{2}{5}$
- $\frac{2}{3} - \frac{1}{2}$
- $\frac{1}{3} + \frac{3}{5}$
- $\frac{3}{4} + \frac{5}{9}$
- $\frac{1}{3} + \frac{1}{4}$
- $\frac{3}{5} + \frac{1}{8}$
- $\frac{3}{4} + \frac{2}{5}$
- $\frac{7}{8} - \frac{2}{3}$
- $\frac{1}{3} + \frac{1}{6}$
- $\frac{2}{3} - \frac{1}{6}$
- $\frac{2}{3} + \frac{1}{12}$
- $\frac{2}{9} + \frac{5}{18}$
- $\frac{1}{2} - \frac{1}{8}$
- $\frac{1}{5} - \frac{1}{10}$
- $\frac{3}{4} - \frac{5}{8}$
- $\frac{1}{4} - \frac{1}{8}$

• Check your answers.



Idea

The new denominator should be the smallest possible value.

This smallest value is the LCM of the original denominators.

Often, the LCM is the product of the denominators.

BUT, sometimes the lowest common multiple is NOT the

product of the denominators – eg the LCM of 2 and 8 is 8 (not 16)

WORKSHEET 7

Supplementary worksheets for Y8 Fission and Chyps

page 11

WORKSHEET 7

PRACTICE

P1.3: Practice in adding and subtracting fractions

Evaluate and show all your working out.

Give all answers in simplest form.

Do one batch of questions at a time, then check your answers.

You may not need to do every batch.

STOP when you feel that you have mastered the techniques needed.

Batch A	Batch B	Batch C	Batch D
1. $\frac{1}{2} + \frac{2}{7}$	1. $\frac{5}{8} + \frac{1}{6}$	1. $\frac{7}{8} - \frac{1}{5}$	1. $\frac{1}{8} + \frac{1}{4} + \frac{3}{16}$
2. $\frac{5}{6} - \frac{2}{5}$	2. $\frac{5}{6} + \frac{1}{5}$	2. $\frac{5}{9} - \frac{2}{5}$	2. $\frac{3}{5} + \frac{1}{10} + \frac{7}{15}$
3. $\frac{11}{12} - \frac{3}{4}$	3. $\frac{3}{7} + \frac{2}{5}$	3. $\frac{13}{15} + \frac{1}{2}$	3. $\frac{2}{3} + \frac{1}{6} + \frac{1}{12}$
4. $\frac{1}{8} + \frac{3}{4}$	4. $\frac{9}{10} - \frac{11}{15}$	4. $\frac{3}{10} + \frac{5}{6}$	4. $\frac{3}{4} - \frac{5}{8} + \frac{1}{2}$
5. $\frac{3}{10} + \frac{1}{6}$	5. $\frac{2}{5} + \frac{5}{8}$	5. $\frac{7}{10} - \frac{1}{3}$	5. $\frac{4}{5} - \frac{2}{3} + \frac{1}{2}$

DEVELOPMENT

D1.4: Adding and subtracting mixed numbers

$$\begin{aligned} \text{EXAMPLES} \quad \frac{1}{2} + \frac{2}{3} &= 1 + 2 + \frac{1}{2} + \frac{2}{3} \\ &= 3 + \frac{3}{6} + \frac{4}{6} \\ &= 3\frac{7}{6} = 4\frac{1}{6} \end{aligned}$$

$$\begin{aligned} \frac{3}{3} - \frac{1}{5} &= 3 - 1 + \frac{1}{3} - \frac{1}{5} \\ &= 2 + \frac{5}{15} - \frac{3}{15} \\ &= 2\frac{2}{15} \end{aligned}$$

Evaluate and show all your working out.

Give answers in simplest form.

- $2\frac{1}{2} + 1\frac{1}{3}$
- $1\frac{1}{4} + 3\frac{3}{8}$
- $3\frac{3}{5} - 1\frac{1}{10}$
- $1\frac{5}{8} + 2\frac{1}{16}$
- $2\frac{5}{6} + 4\frac{1}{10}$
- $5\frac{7}{8} - 2\frac{1}{2}$
- $2\frac{4}{9} + 3\frac{2}{5}$
- $5\frac{5}{7} + 1\frac{5}{14}$

• Check your answers.

Star Challenge

Fraction challenge

Evaluate and show all your working out.

Give answers in simplest form.

- $\frac{1}{2} + \frac{1}{3}$
- $\frac{3}{4} + \frac{3}{8}$
- $\frac{4}{5} - \frac{3}{10}$
- $1\frac{3}{9} + 2\frac{1}{6}$
- $\frac{5}{6} - \frac{1}{3}$
- $1\frac{2}{5} + 3\frac{3}{8}$
- $2\frac{4}{7} + 1\frac{3}{5}$
- $\frac{4}{25} + \frac{7}{10}$
- $\frac{5}{8} + \frac{1}{4} - \frac{1}{16}$
- $\frac{7}{8} - \frac{2}{3} + \frac{1}{5}$

• Your teacher has the answers.

10 correct = 2 stars
8-9 correct = 1 star

Worksheet 8: Ordering decimals & fractions

In this section you will:

- put decimals in order
- change fractions to decimals to 2 or 3 d.p.
- put fractions in order using equivalent fractions or decimals

DEVELOPMENT

D1.1: Ordering decimals

To order numbers, compare corresponding pairs of digits (units and units, tenths and tenths ...) starting with the digits on the left.



Idea

EXAMPLE Which is bigger, 0.403 or 0.43 ?

both numbers have 0 units and 4 tenths \rightarrow 0.403 \leftarrow 0.43 \leftarrow 3 hundredths is more than 0 hundredths, so the bottom number is bigger

So, $0.43 > 0.403$ (0.43 is bigger than 0.403)

Arrange the numbers in order of size, with the smallest first:

- 0.23, 0.203, 0.32
 - 0.06, 0.04, 0.46
 - 0.8, 0.77, 0.777
 - 0.1, 0.09, 0.9
 - 0.005, 0.05, 0.049
 - 0.13, 0.31, 0.013
 - 0.709, 0.71, 0.7
 - 0.1, 0.11, 0.01
 - 0.04, 0.14, 0.014
 - 0.001, 0.03, 0.1
 - 0.12, 1.02, 0.102
 - 1.65, 1.56, 5.61, 6.15
- Check your answers.

D1.2: Approximate decimal equivalents of fractions

$\frac{47}{60} = 0.78333\dots$

1st decimal place 3rd decimal place

Since the number after the third decimal place is less than 5, the 3 is NOT rounded up.



Yerwat

$\frac{47}{60} = 0.783$ to 3 d.p. (3 decimal places)

- To 2 d.p., does $\frac{47}{60} = 0.78$ or 0.79 ? Explain why.
 - What is $\frac{23}{30}$ to 2 d.p. ?
 - What is $\frac{23}{30}$ to 3 d.p. ?
 - What is $\frac{15}{24}$ to 2 d.p. ?
 - What is $\frac{15}{24}$ to 3 d.p. ?
 - What is $\frac{57}{80}$ to 3 d.p. ?
 - What is $\frac{61}{96}$ to 3 d.p. ?
- Check your answers.

WORKSHEET 8

Supplementary worksheets for Y8 Fission and Chyps

page 12

WORKSHEET 8

D1.3: Using decimals to order/compare fractions

EXAMPLE Put these fractions into ascending order $\frac{1}{5}, \frac{2}{15}, \frac{3}{13}, \frac{2}{9}$
 $\frac{1}{5} = 0.2$ $\frac{2}{15} \approx 0.133$ $\frac{3}{13} \approx 0.231$ $\frac{2}{9} \approx 0.222$ (to 3 d.p.)

\therefore fractions in order are $\frac{2}{15}, \frac{1}{5}, \frac{2}{9}, \frac{3}{13}$ ≈ means approximately equal to

Put each set of fractions into ascending order:

1. $\frac{5}{11}, \frac{2}{5}, \frac{4}{9}, \frac{3}{7}$ 2. $\frac{3}{8}, \frac{2}{9}, \frac{1}{3}, \frac{5}{18}$ 3. $\frac{5}{8}, \frac{7}{9}, \frac{2}{3}, \frac{11}{16}$

Find the largest fraction in each of these sets:

4. $\frac{23}{26}, \frac{13}{18}, \frac{11}{13}, \frac{33}{77}$ 5. $\frac{5}{13}, \frac{3}{7}, \frac{1}{3}, \frac{73}{173}$ 6. $\frac{53}{65}, \frac{11}{13}, \frac{59}{80}$

• Check your answers.

D1.4: Using equivalent fractions

EXAMPLE Put these fractions in ascending order: $\frac{2}{3}, \frac{5}{6}, \frac{5}{8}$
 The LCM of 3, 6 and 8 is 24 $\therefore \frac{2}{3} = \frac{16}{24}$ $\frac{5}{6} = \frac{20}{24}$ $\frac{5}{8} = \frac{15}{24}$
 \therefore in ascending order, the fractions are: $\frac{5}{8}, \frac{2}{3}, \frac{5}{6}$

Write each set of fractions in ascending order:

1. $\frac{5}{6}, \frac{2}{3}, \frac{1}{2}$ 2. $\frac{13}{16}, \frac{3}{4}, \frac{5}{8}$ 3. $\frac{3}{10}, \frac{2}{5}, \frac{4}{15}, \frac{3}{5}$ 4. $\frac{3}{7}, \frac{2}{3}, \frac{5}{8}, \frac{5}{6}$

• Check your answers.

Star Challenge 8A

True or false ?

Reminder: $>$ means 'is greater than' $<$ means 'is less than'

- $0.04 = 0.4$
 - $0.7 = .7$
 - $0.20 = 0.2$
 - $0.82 > 0.28$
 - $0.61 < 0.16$
 - $5.03 < 5.30$
 - $9 = 9.00$
 - $0.59 < 0.60$
 - $0.9 > 0.87$
 - $0.7 < 0.08$
 - $0.214 < 0.24$
 - $6 = 0.6$
- Your teacher has the answers to these.

11-12 correct = 1 star

Star Challenge 8B/8B

A decimal-fraction mixture

Task 1: Which is the bigger in each pair:

- $\frac{253}{637}$ or 0.4
- $\frac{3}{11}$ or 0.275
- $\frac{56}{85}$ or 0.658
- $\frac{15}{19}$ or 0.79

Task 2: Find the biggest fraction in each set:

- $\frac{7}{10}, \frac{5}{6}, \frac{7}{9}, \frac{17}{24}$
 - $\frac{3}{4}, \frac{5}{8}, \frac{10}{17}, \frac{21}{32}$
 - $\frac{5}{7}, \frac{49}{71}, \frac{65}{94}, \frac{84}{122}$
- Your teacher has the answers to these.

6-7 correct = 1 star

plus

clear working = 1 star

Worksheet 9: Decimal arithmetic (Three sections)

page 1 (of 3 pages)

Section 1: + and - decimals

DEVELOPMENT

D1.1: Adding decimals

EXAMPLE Work out $4.35 + 2.8 + 6$

$$\begin{array}{r} \text{U} \cdot \text{t} \text{h} \\ 4 \cdot 3 \text{ 5} \\ + 2 \cdot 8 \text{ 0} \\ + 6 \cdot \text{ 0 0} \\ \hline 1 \text{ 3} \cdot 1 \text{ 5} \\ \uparrow \\ 1 \end{array}$$

Always line up the decimal points.
You might find it easier if you add zeros to make each number have the same number of decimal places.



Yerwat

line up the decimal points

$$\begin{array}{r} \text{U} \cdot \text{t} \text{h} \\ 4 \cdot 3 \text{ 5} \\ + 2 \cdot 8 \text{ 0} \\ + 6 \cdot 0 \text{ 0} \\ \hline 1 \text{ 3} \cdot 1 \text{ 5} \\ \uparrow \\ 1 \end{array}$$

line up the decimal points

Work out, showing all your working clearly:

- $2.35 + 4.5$
- $43.86 + 3.9$
- $231.6 + 56.38$
- $6 + 2.5 + 1.8 + 0.4$
- $412.3 + 62.64 + 3.09$
- $55.9 + 134.62 + 3.41 + 4$
- $16.437 + 2.49 + 24.405$
- $4 + 5.3 + 2.36 + 5.007$



Gizmo

• Check your answers.

D1.2: Subtracting decimals

EXAMPLE Work out (a) $58.6 - 4.35$ (b) $16 - 4.71$

$$\begin{array}{r} \text{T U} \cdot \text{t h} \\ 5 \text{ 8} \cdot 6 \text{ 0} \\ - 4 \cdot 3 \text{ 5} \\ \hline 5 \text{ 4} \cdot 2 \text{ 5} \\ \uparrow \end{array}$$

line up the decimal points

$$\begin{array}{r} \text{T U} \cdot \text{t h} \\ 1 \text{ 6} \cdot 0 \text{ 0} \\ - 4 \cdot 7 \text{ 1} \\ \hline 1 \text{ 1} \cdot 2 \text{ 9} \\ \uparrow \end{array}$$

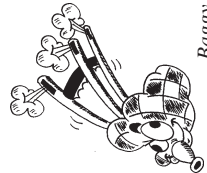
line up the decimal points

← put a zero in here

← put two zeros in here

Work out, showing all your working clearly:

- $12.45 - 5.23$
- $8 - 6.4$
- $23.56 - 8.1$
- $32.43 - 14.17$
- $169.78 - 67.5$
- $1060.3 - 79.08$
- $7 - 3.35$
- $7 - 3.35$
- $15 - 2.4$
- $27.5 - 4.357$



Baggy

• Check your answers.

D1.3: Mental + and - of simple decimals

EXAMPLE Work out $3.4 + 5.2$

$$3.4 + 5.2 = 7.6$$

$$\begin{array}{r} 3.4 + 5.2 = 7.6 \\ \hline 3.4 + 5.2 = 7.6 \end{array}$$



Gizmo

Work out:

- $0.2 + 0.5$
- $0.9 - 0.2$
- $1.5 + 0.7$
- $2.7 - 0.4$
- $1.5 + 0.5$
- $3.9 - 1.5$
- $0.8 + 2.3$
- $4.5 + 1.5$
- $3.1 - 0.6$
- $7.5 - 2.5 + 1.1$
- $8.6 + 1.4 + 0.2$
- $3.9 - 1.3 + 1.5$

• Check your answers.

D1.4: Multi-stage + and - problems

EXAMPLE Work out $8.41 + 2.9 - 1.25$

$$\begin{array}{r} 8.41 \\ + 2.90 \\ \hline 11.31 \\ - 1.25 \\ \hline 10.06 \end{array}$$

So, $8.41 + 2.9 - 1.25 = 10.06$

Work out:

- $3.4 + 7.21 - 5.3$
- $8.92 - 2.6 - 1.41$
- $6 + 12.67 - 3.4$
- $7 - 2.68 + 3.8$
- $16.24 + 24.59 - 17.13$
- $20 - 13.65 - 2.74$

• Check your answers.

Star Challenge 9A

A one star challenge

- Work out:
- $2.57 + 3.4 + 16$
 - $9.83 - 6.2$
 - $25.66 + 13.1 + 5$
 - $5 - 2.85$
 - $6.87 - 2.3 - 1$
 - $20 + 15.84 + 13.2$
 - $6.5 + 2.4 + 3$
 - $10 - 5.5$
 - $8.52 + 7.1 - 3.22$

• Your teacher has the answers to these.

Star Challenge 9B-9B

A two star challenge

- Work out:
- $14 - 3.96 - 2.7$
 - $6.47 + 9.103 + 4.8$
 - $25 - 18.45 + 2.378$
 - $32.9 + 46.3 - 35.23$
 - $37.043 - 12.444$
 - $31.05 - 2.875$
 - $125.75 + 3.96 - 7.2$
 - $18.56 + 3.8 - 6.44 - 16.5 + 2.03$

• Your teacher has the answers to these.

Section 2: Multiplying with decimals

In this section you will:

- review mental multiplication techniques for decimals
- use written methods of multiplication for decimals

DEVELOPMENT

D2.1: Multiplying decimals in your head

EXAMPLE Work out 3×2.3



$$\begin{array}{r} 3 \times 2.3 = 6.9 \\ \hline \end{array}$$

$$3 \times 2.3 = 6.9$$

Work out:

- 5×0.15
 - 3×2.5
 - 4×0.8
 - 5×3.1
 - 4×2.2
- Check your answers.

D2.2: Related multiplications

- $2 \times 3 = 6$ What is (a) 2×0.3 (b) 0.2×3 (c) 0.2×0.3 ?
- $14 \times 7 = 98$ What is (a) 14×0.7 (b) 1.4×7 (c) 1.4×0.7 ?
- $45 \times 27 = 1215$ What is (a) 45×2.7 (b) 4.5×27 (c) 4.5×2.7 ?

EXAMPLE

Work out 235×5 and check it by estimation.

Hence state the value of (i) 23.5×5 (ii) 2.35×5

$$\begin{array}{r} 235 \\ \times 5 \\ \hline 1175 \\ \hline \end{array}$$

$$235 \times 5 = 1175$$

Check: $200 \times 5 = 1000$,
and this is a reasonable estimate for the answer

$$\text{Hence (i) } 23.5 \times 5 = 117.5 \text{ (ii) } 2.35 \times 5 = 11.75$$

- Work out 724×3 and check it by estimation.

Hence state the value of (i) 72.4×3 (ii) 7.24×3

• Check your answers.

D2.3: Decimal multiplication by a single digit integer

EXAMPLE Work out 4.72×4

$$\begin{array}{r} 4.72 \\ \times 4 \\ \hline 18.88 \\ \hline \end{array}$$

$$4.72 \times 4 = 18.88$$

so work out 472×4 and divide answer by 100 (which agrees with the estimate)

Work out, using the method of the example. Check by estimation.

- 29.5×5
- 3.62×7
- 14.3×9
- 51.32×6

• Check your answers.

D2.4: Decimal multiplication by a 2-digit number

EXAMPLE Work out 1.73×23

Estimate: $2 \times 20 = 40$

$$\begin{array}{r} 173 \\ \times 23 \\ \hline \end{array}$$

$173 = 1.73 \times 100$ so work out 173×23 and divide answer by 100

$$\begin{array}{r} 3460 \\ \times 20 \\ \hline \end{array}$$

$$3979$$

So, $1.73 \times 23 = 39.79$
(which agrees with the estimate)

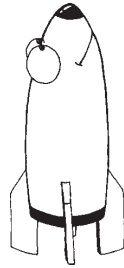
Work out, using the method of the example. Check by estimation.

- 38.5×14
- 5.78×26
- 16.8×3.5
- 37.1×3.2

• Check your answers.

Star Challenge 9C9C

Multiplication problems



6 correct = 2 stars
4-5 correct = 1 star

The Pan-Galactic Explorers come from many star systems. On board the star ships, the money system is credits and cents. 1 credit = 100 cents.



Gizmo

- Gizmo buys 8 Handel Bars (the PGEs favourite snack). One Handel Bar costs 1.89 credits.

How much will the 8 bars cost Gizmo ?

- The storemaster, Youslas, buys Handel Bars in boxes of 24. The cost price is 1.76 credits per bar.

How much is the cost price of a box of Handel Bars ?

- Frizzbang takes a holiday job whilst on Earth. Frizzbang gets paid 8.35 euros per hour.

How much does Frizzbang earn for 37 hours work ?

- Zuk is very hungry. He is also very greedy. He orders 5 plates of splatz which cost 13.85 credits each.

What will be the total cost of the five plates of splatz ?

- Lubby books 7 tickets for flights on the Mars shuttle. Each ticket costs 948.85 credits.

What will be the total cost of the tickets ?

- Peysymistic buys 17 CDs over the Intergalactic Internet. Each CD costs 13.68 credits

How much will the 17 CDs cost ?

Each answer must be accompanied by a clear set of working to be marked correct.

• Your teacher has the answers to these.



Section 3: Dividing with decimals

In this section you will:

- divide a simple decimal by a single digit number
- divide a whole number by a simple decimal
- divide a decimal by a single digit number
- relate decimal arithmetic to integer arithmetic techniques

DEVELOPMENT

D3.1: Dividing decimals mentally

EXAMPLE $1.2 \div 4 = ?$

$$\circ \circ (12 \div 4 = 3) \circ$$



Modesto

Work out:

- $0.6 \div 2$
- $2.5 \div 5$
- $0.8 \div 4$
- $2.4 \div 6$
- $0.25 \div 5$

• Check your answers.

D3.2: Dividing whole numbers by simple decimals

EXAMPLE $1 \div 0.1 = ?$

Think of this as 'how many 0.1s are there in 1?'

$$\text{So, } 1 \div 0.1 = 10$$



Sureshot

Work out:

- $1 \div 0.5$
- $2 \div 0.5$
- $2 \div 0.25$
- $1 \div 0.2$
- $3 \div 0.2$

• Check your answers.

D3.3: Division of a decimal by a single digit number

Division of a decimal can be done by 'chunking' or the 'standard method'.

The trick is to work out a related division with whole numbers.

EXAMPLE

Work out $7.72 \div 4$

Estimate : $8 \div 4 = 2$

$772 = 7.72 \times 100$ so we work out $772 \div 4$ and divide the answer by 100

So, $7.72 \div 4 = 193 \div 100 = 1.93$ which agrees with the estimate.

Work out:

- $3.75 \div 5$
- $12.8 \div 4$
- $15.3 \div 9$
- $3.56 \div 4$
- $12.5 \div 5$

• Check your answers.

D3.4: Related arithmetic techniques

+, −, ×, and short division techniques for decimals can be the same as those for whole numbers. The trick is to always keep the decimal points lined up beneath each other.

$$\begin{array}{r} 36 \\ + 13 \\ \hline 49 \end{array}$$

$$\begin{array}{r} 58 \\ - 23 \\ \hline 35 \end{array}$$

$$\begin{array}{r} 25 \\ \times 3 \\ \hline 75 \end{array}$$

$$\begin{array}{r} 55 \\ 5 \overline{) 275} \\ \underline{50} \\ 275 \\ \underline{250} \\ 25 \end{array}$$

$$\begin{array}{r} 5.5 \\ 5 \overline{) 27.5} \\ \underline{50} \\ 275 \\ \underline{250} \\ 25 \end{array}$$

Evaluate showing all working:

- $8.5 + 3.6$
- $2.35 + 4.11$
- $3.95 - 2.76$
- 3×4.52
- 7.3×5
- 6.25×3
- $6.72 \div 4$
- $8.95 \div 5$

• Check your answers.

Star Challenge

4-5 correct = 1 star

Decimal problems

EXAMPLE Work out the total cost of 5 kg of tomatoes @£1.75 per kg and 3 kg of carrots @ 35p per kg.

$$\begin{array}{r} 1.75 \\ \times 5 \\ \hline 8.75 \\ 1.05 \\ \hline 9.80 \end{array}$$

Note:

- prices given in pence must be changed to prices given in £
- each multiplication is shown clearly at the side
- @ means 'at'

- Work out the total cost of 3 kg of raspberries @£5.26 per kg, 4 kg of strawberries @ £3.48 per kg and 5 kg potatoes @ 42p per kg.
- One ticket at the Magic Cinema costs £1.95. Work out the cost of 6 tickets.
- Four tickets to the Icerink cost £14.60. Work out the cost of 1 ticket.
- Karli gets paid £4.85 per hour. What would she earn for working (a) 10 hours (b) 6 hours?

• Your teacher has the answers to these.

Star Challenge

7 correct = 2 stars

5-6 correct = 1 star

More decimal problems

- Paulo gets paid £5.15 per hour to work at "The Caff". What would he earn for working (a) 20 hours (b) 7 hours (c) 27 hours?
- Tickets for the football match cost £21.60. How much would it cost for 4 tickets?
- Tickets for the zoo are £9.25 for each adult and £4.50 for each child. How much would it cost for four adults and six children?
- Melanie makes cakes for the coffee shop. She charges £15.90 for six cakes. How much is that for one cake?
- Yossi buys 3 CDs @ £9.80, 4 DVDs @ £14.65 and 3 packs of tapes @ 74p. Work out the total cost.

• Your teacher has the answers to these.

Worksheet 10: Percentages with a calculator

In this section you will:

- review the meaning of words used with percentages
- work out percentage increases and decreases mentally
- calculate percentages of amounts using a calculator.

DEVELOPMENT

D1.1: What do the words mean ?

Match each word with one of the meanings in the box.

- Word
- Profit
Commission
Loss
Discount
Service charge

Meaning

- A: Reduction in price, usually given as a percentage
B: How much you make if you sell something at a higher price than it cost.
C: How much you lose if you sell something at a lower price than it cost.
D: 'Tip' added to the bill in a restaurant or café
E: Amount earned on a sale (by estate agent, car salesman ...)

D1.2: Increases and decreases in your head

Old amount + increase = new amount
Old amount - decrease = new amount

If something increases by 100%, it doubles in size.

If something increases by 200%, it increases by two times itself, and is then three times its original size.

If something increases by 50%, it increases by half of itself, and is then one and a half times its original size.

A 100% decrease reduces the amount to zero.



Driller

For questions 1-10, work out:

- (a) how much is the increase or decrease ?
(b) how much is the new amount ?

- £5 is increased by 100%.
- £7 is increased by 200%.
- £6 is decreased by 50%.
- £5 is increased by 50%.
- £8 is increased by 25%.
- £20 is increased by 10%
- £20 is decreased by 10%
- £20 is increased by 100%
- £20 is decreased by 25%
- £20 is decreased by 100%
- The "Best Ever Investment Fund" increased investors money by 300% in 1994.
How much would your investment have been worth if the amount you had in the fund was (a) £1 000 (b) £200 ?

• Check your answers.

WORKSHEET 10

Supplementary worksheets for Y8 Fission and Chypso

page 16

WORKSHEET 10

D1.3: Calculating percentages of amounts

$$15\% \text{ of } £20 = 0.15 \times 20 = £3$$

change to a decimal

$$115\% \text{ of } £20 = 1.15 \times 20 = £23$$

$$\begin{aligned} 15\% &= 0.15 \\ 3\% &= 0.03 \\ 20\% &= 0.2 \\ 12\frac{1}{2}\% &= 0.125 \\ 115\% &= 1.15 \end{aligned}$$



Yervat

Use this method to work out these percentages of amounts.

Give each answer to the nearest penny.

- 14% of £50
- 8% of £25
- 27% of £14
- 30% of £12.50
- 2% of £19
- 17½% of £72
- 3% of £15
- 3.5% of £18
- 135% of £28
- 117.5% of £248

• Check your answers.

D1.4: Percentage increases and decreases

If you increase an amount by 5%, you get 105% of the original amount = 1.05

If you decrease an amount by 5%, you get 95% of the original amount = 0.95

- What percentage of the original amount do you get if you increase it by 12% ?
What is this percentage as a decimal ?
- What percentage of the original amount do you get if you decrease it by 12% ?
What is this percentage as a decimal ?

EXAMPLES (a) The price of a TV that cost £256 was increased by 7%.

Work out the new price ?

(b) The price of a hand-held computer was £242. In the sale it was discounted by 5%. What is the sale price ?

$$(a) \text{ Price} = 1.07 \times £256 = £273.92$$

$$(b) \text{ Price} = 0.95 \times £242 = £229.90$$

Note that the calculator gave £229.9 – but this must then be changed into money notation.

- Frank's wage was £182 per week. He was given a 10% rise. What is his new wage ?
- The price of a TV is £450. In the sale, the price is reduced by 5%. What is the sale price ?
- The restaurant bill came to £43.60. Erroll added 12% to the bill as a tip.
How much did he pay ?

A set of tables and chairs cost £350. The table is scratched.

Sonia is offered a 15% discount. How much does she have to pay ?

The bill in the café came to £15.80. Meera added a 10% tip to the bill.

How much did she pay ?

Sandra got a 4% pay rise. Before the rise, she had been earning £18,600 a year.

How much did she get after the rise ?

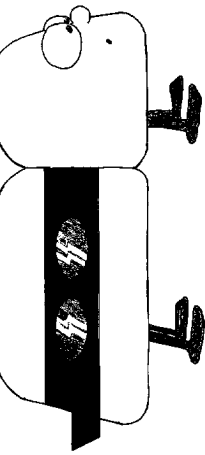
• Check your answers.

Worksheet 11: Scales, plans & elevations

1 A4 page only

DEVELOPMENT

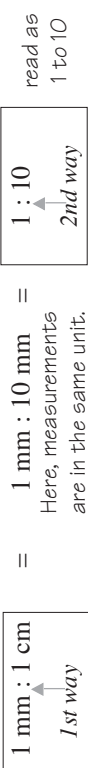
D1.1: Understanding scales



- The scale of this diagram of the Pair-Galactic ore carrier is 1 cm : 30 m. This means that every 1 cm on the diagram represents 30m on the ore carrier.

Work out the actual length and height of the ore carrier.

Two ways of giving scales

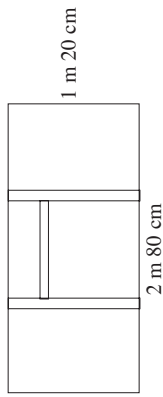


- 1 mm : 1 cm is the same as 1 : 10

Write each of these scales as 1 : n.

- 1 cm : 4 cm
- 1 mm : 5 cm
- 1 cm : 1 m
- 1 cm : 2.5 m

- A scale drawing is made of this rectangular window. The scale used is 1 cm : 10 cm.



In the drawing, what is

- the length of the window ?
- the height of the window ?

- Another scale drawing is made of the same window.

The scale used is 1 : 20

In this drawing, what is

- the length of the window ?
- the height of the window ?

- A scale drawing of a shop floor is a rectangle 9 cm by 4 cm. The scale used is 1 : 500

- Rewrite this scale in the form 1 cm : ... m
- What is the length and width of the actual shop floor ?

- This is a sketch (not drawn to scale) of Sue's garden. A plan is drawn of the garden, using a scale of 1 cm : 10 m.

On the plan what is :

- the length of the garden ?
- the width of the widest part of the garden ?
- the width of the narrowest part of the garden ?

• Check your answers.

D1.2: Plans and elevations

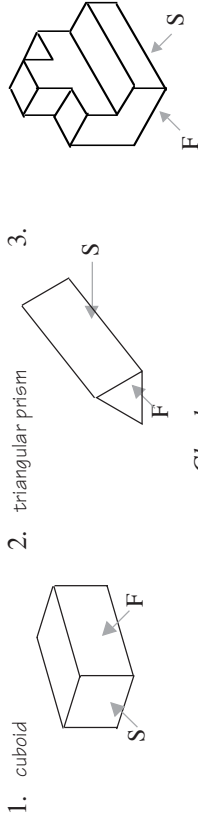
The PLAN is the view looking directly down onto the object.

The SIDE ELEVATION is the view looking directly at the side of the object.



The front and side elevations are usually drawn side by side.

For each object, draw a plan, a front elevation and a side elevation. The directions that the elevations should be taken from are shown by arrows labelled F and S.



• Check your answers.

D1.3: 3-D shapes from plans and elevations

Match each set of plan and elevations with one of the 3-D shapes:

	Front elevation	Side elevation	Plan
A			
B			
C			
D			
E			
F			

	sphere
	square based pyramid
	tetrahedron
	cylinder
	octahedron
	cone

Worksheet 1

D1.1: Division in disguise

1. 4 2. 3 3. 3 4. 5 5. 6 6. 4
7. 7 8. 3 9. 5 10. 2 11. £3

D1.2: Division using chunking

1. 13 rem 4 2. 56 rem 4 3. 92 rem 3
4. 44 rem 10

D1.3: Systematic chunking

1. 56 rem 5 2. 81 rem 2 3. 91 rem 3
4. 48 rem 5 5. 52 rem 1 6. 58 rem 11
7. 31 8. 150 rem 3

D1.4: The standard method of division

1. 73 rem 1 2. 69 rem 1 3. 40 rem 1
4. 75 rem 5 5. 26 rem 5 6. 77 rem 6
7. 54 rem 3 8. 132 rem 1

D1.5: Division by a 2-digit number

1. 24 rem 15 2. 22 rem 22 3. 48 rem 4 4. 17

D2.1: Division using related number facts

1. 4 2. 7 3. 4 4. 3 5. 9 6. 6
7. 6 8. 3 9. 5 10. 3 11. 13 12. 11
13. 6 14. 8 15. 10

D2.2: Sharing problems

1. $2\frac{1}{2}$ 2. $1\frac{1}{4}$ 3. $3\frac{1}{3}$ 4. $3\frac{2}{3}$ 5. $1\frac{3}{4}$

D2.3: Dividing whole numbers with fraction...

1. $2\frac{1}{2}$ 2. $4\frac{1}{2}$ 3. $3\frac{1}{3}$ 4. $7\frac{1}{3}$ 5. $3\frac{1}{5}$
6. $3\frac{1}{6}$ 7. $7\frac{1}{7}$ 8. $3\frac{2}{3}$ 9. $5\frac{2}{5}$ 10. $3\frac{2}{7}$

Worksheet 2

D1.1: Using brackets on a calculator

12. 1854.42 13. 227.27 14. 1.16
15. 11.11 16. 143.08 17. 7.18
18. 35.93 19. 2.38 20. 36.72

D1.2: Using the memory on a calculator

5. 4.47 6. 2.90 7. 14.06

Worksheet 3

D1.1: Reading and writing large numbers

1. 34 thousand and 25
2. 321 thousand 7 hundred and 60
3. 3 million 476 thousand 4. 2 hundred & 50 thousand
5. 3 thousand pounds 6. 40 thousand pounds
7. 5 hundred thousand pounds 8. 6 million pounds
9. 8 million pounds 10. 3 billion pounds
11. 6 million 4 hundred thousand pounds
12. 2 billion 3 hundred million dollars
13. 5 hundred million dollars
14. 16 billion 35 million dollars
15. 5,000,000 16. 3,700,000 17. 15,003,000
18. 7,000,000,000 19. 4,300,000,000
20. 2,050,000,000 21. 4,000,000
22. 93 million miles 23. 14,000,000,000 years

ANSWERS

D1.2: Fractions of millions and billions

1. (a) a quarter of a million (b) three quarters of a million (c) 2,750,000
2. (a) 3,500,000 (b) 1,250,000 (c) 2,750,000
3. (a) $7\frac{1}{2}$ million (b) $3\frac{1}{4}$ million
4. (a) a quarter of a billion (b) three quarters of a billion (c) 750,000,000 (d) 6,250,000,000
5. (a) 1,700,000 (b) 1,700,000 (c) 3,100,000,000 (d) 1,600,000,000 (e) 4,500,000 (f) 4.5 million (g) £9,100,000 4. 21,500,000

D1.3: Using decimal notation for millions ...

1. (a) 2,500,000 (b) 1,700,000 (c) 3,100,000,000 (d) 1,600,000,000 (e) 4,500,000 (f) 4.5 million (g) £9,100,000 4. 21,500,000
5. 1 billion 417 million 760 thousand 6. 2 million 330 thousand km

D1.4: Rounding very large numbers

1. (a) 13,990 (b) 14,000 (c) 14,000
2. (a) 790,000 (b) 800,000
3. (a) 1,089,000 (b) 1,090,000 (c) 1,100,000
4. (a) 7,000,000 (b) 6,879,000 (c) 6,900,000
5. (a) 4,000,000,000 (b) 3,571,000,000 (c) 3,600,000,000
6. (a) 299,800 km/s (b) 300,000 km/s (c) 300,000 km/s (d) 300,000 km/s

Worksheet 4

D1.1: Midpoints of line segments

1. (a) (2.5) (b) (5.4) (c) (5.1) (d) (2.2)
2. (a) (-2.4) (b) (5.1) (c) (0.0) (d) (-1.5) (e) (-7.5) (f) (1.5) (g) (-7.5) (h) (4, -6) (i) (2, -1)
3. (a) (6, -1) (b) (-2, 0) (c) (1, -1)

D1.2: The midpoint formula

1. (a) 6 (b) 6 2. (a) (6, 11) (b) (6, 11)
3. (11, 6) 4. (7, 0) 5. (1, -2) 6. (2, -6)
7. (1.9, 1.9) 8. (-10, 10)

Worksheet 5

D1.1: Two way tables

1. 20 or more 2. 0-9 3. 92% 4. 23% 5. B

D1.2: Scatter graphs

1. A: icecream B: crisps C: hot drinks

Worksheet 6

D1.1: Stem-and-leaf diagrams

1. (a)

3	4	4	6	7	7	8	9
4	2	2	3	4	6	9	
5	1	3					

 (b) 42 (c) 19 (d) 34, 37 and 42
2.

22	6	8	9	9		
23	1	3	4	8	9	
24	0	2	3	7	9	
25	2	3	4	6	8	
26	1	4	4	6	7	9
27	0	1				

 (b) 15. (c) 8 (d) 24.9 & 4.5

Worksheet 7

D1.1: Adding and subtracting fractions

1. $\frac{3}{5}$ 2. $1\frac{1}{7}$ 3. $\frac{1}{4}$ 4. $1\frac{1}{4}$ 5. $\frac{5}{9}$
6. $\frac{2}{5}$ 7. $\frac{1}{3}$ 8. 1 9. $1\frac{1}{15}$ 10. $\frac{5}{12}$ 11. $1\frac{7}{8}$

D1.2: + & - proper fractions

1. $\frac{9}{10}$ 2. $\frac{1}{6}$ 3. $1\frac{1}{15}$ 4. $1\frac{1}{36}$ 5. $\frac{7}{12}$ 6. $\frac{29}{40}$
7. $1\frac{3}{20}$ 8. $\frac{5}{24}$ 9. $\frac{1}{5}$ 10. $\frac{1}{2}$ 11. $\frac{3}{4}$ 12. $\frac{1}{2}$
13. $\frac{3}{8}$ 14. $\frac{1}{10}$ 15. $\frac{1}{8}$ 16. $\frac{1}{20}$

D1.3: Practice in + & - fractions

- Batch A:** 1. $1\frac{1}{4}$ 2. $1\frac{3}{5}$ 3. $\frac{1}{6}$ 4. $\frac{7}{6}$ 5. $\frac{7}{15}$
- Batch B:** 1. $1\frac{9}{24}$ 2. $1\frac{1}{30}$ 3. $\frac{29}{35}$ 4. $\frac{1}{6}$ 5. $1\frac{1}{40}$
- Batch C:** 1. $\frac{27}{40}$ 2. $\frac{7}{30}$ 3. $1\frac{11}{30}$ 4. $1\frac{2}{15}$ 5. $1\frac{11}{30}$
- Batch D:** 1. $\frac{9}{16}$ 2. $1\frac{1}{6}$ 3. $1\frac{1}{12}$ 4. $\frac{5}{8}$ 5. $1\frac{9}{40}$

D1.4: Adding and subtracting mixed numbers

1. $3\frac{3}{8}$ 2. $4\frac{5}{8}$ 3. $2\frac{1}{2}$ 4. $3\frac{11}{16}$ 5. $6\frac{14}{15}$
6. $3\frac{3}{8}$ 7. $5\frac{39}{45}$ 8. $7\frac{1}{14}$

Worksheet 8

D1.1: Ordering decimals

1. 0.203, 0.23, 0.322, 0.04, 0.06, 0.46
3. 0.77, 0.777, 0.8 4. 0.09, 0.1, 0.9
5. 0.005, 0.049, 0.05 6. 0.013, 0.13, 0.31
7. 0.7, 0.709, 0.71 8. 0.01, 0.1, 0.11
9. 0.014, 0.04, 0.14 10. 0.001, 0.03, 0.1
11. 0.102, 0.12, 1.02 12. 1.56, 1.65, 5.61, 6.15

D1.2: Approximate decimal equivalents of fr.

1. 0.78 ; The number after the second decimal place is less than 5, so the 8 is not rounded up.
2. 0.77 3. 0.767 4. 0.63 5. 0.091
6. 0.713 7. 0.635

D1.3: Using decimals to order/compare fractions

1. $\frac{2}{5}$, $\frac{3}{7}$, $\frac{4}{10}$, $\frac{5}{11}$ 2. $\frac{2}{5}$, $\frac{5}{18}$, $\frac{1}{3}$, $\frac{3}{6}$
3. $\frac{5}{8}$, $\frac{2}{11}$, $\frac{1}{10}$, $\frac{6}{9}$ 4. $\frac{23}{26}$, 5 , $\frac{3}{7}$, 6 , $\frac{11}{13}$

D1.4: Using equivalent fractions

1. $\frac{1}{5}$, $\frac{2}{5}$, $\frac{5}{10}$ 2. $\frac{5}{8}$, $\frac{3}{4}$, $\frac{13}{16}$ 3. $\frac{4}{15}$, $\frac{3}{10}$, $\frac{2}{5}$, $\frac{3}{5}$
4. $\frac{3}{7}$, $\frac{8}{8}$, $\frac{2}{3}$, $\frac{5}{6}$

Worksheet 9

D1.1: Adding decimals

- 1) 6.85 2) 47.76 3) 287.98 4) 10.7
- 5) 478.03 6) 197.93 7) 43.332 8) 16.667

D1.2: Subtracting decimals

- 1) 7.22 2) 1.6 3) 15.46 4) 18.26 5) 102.28
- 6) 981.22 7) 311.4 8) 3.65 9) 12.6 10) 23.143

D1.3: Mental + and - of simple decimals

- 1) 0.7 2) 0.7 3) 2.2 4) 2.3 5) 2.6 2.4 7) 3.1
- 8) 69 2.5 10) 6.1 11) 10.212 4.1

D1.4: Multi-stage + and - problems

- 1) 5.31 2) 4.91 3) 15.274 8.12 5) 23.7 6) 3.61

D2.1: Multiplying decimals in your head

1. 0.75 2. 7.5 3. 3.2 4. 15.5 5. 8.8

D2.2: Related multiplications

1. (a) 0.6 (b) 0.6 (c) 0.06 2. (a) 9.8 (b) 9.8 (c) 0.98
3. (a) 121.5 (b) 121.5 (c) 12.15
4. 2172; $700 \times 3 = 2100$ (a) 217.2 (b) 21.72

D2.3: Decimal multiplication by a single ...

1. 147.5; $30 \times 5 = 150$ 2. 25.34; $4 \times 7 = 8$
3. 128.7; $14 \times 10 = 140$ 4. 307.92; $50 \times 6 = 300$

D2.4: Decimal multiplication by a 2-digit ...

1. 539; $40 \times 10 = 400$ 2. 150.28; $6 \times 30 = 1800$
3. 58.8; $20 \times 4 = 804$ 118.72; $40 \times 3 = 120$

D3.1: Dividing decimals mentally

1. 0.3 2. 0.5 3. 0.2 4. 0.4 5. 0.05

D3.2: Dividing whole numbers by simple decimals

1. 2 2. 4 3. 8 4. 5 5. 15

D3.3: Division of a decimal by a single digit number

1. 0.75 2. 3.2 3. 1.7 4. 0.89 5. 2.5

D3.4: Related arithmetic techniques

1. 12.1 2. 6.46 3. 1.19 4. 13.56 5. 36.5
6. 18.75 7. 1.68 8. 1.79

Worksheet 10

D1.1: What do the words mean ?

- Profit: B Commission: E Loss: C
Discount: A Service charge: E

D1.2: Increases and decreases in your head

1. (a) £5 (b) £10 2. (a) £14 (b) £21
3. (a) £3 (b) £3 4. (a) £2.50 (b) £7.50
5. (a) £2 (b) £10 6. (a) £2 (b) £22
7. (a) £2 (b) £18 8. (a) £20 (b) £40
9. (a) £5 (b) £15 10. (a) £20 (b) £0
11. (a) £4,000 (b) £800

D1.3: Calculating percentages of amounts

1. £7 2. £2 3. £3.78 4. £3.75 5. £0.38
6. £12.60 7. £0.45 8. £0.63 9. £37.80
10. £291.40

D1.4: Percentages increases and decreases



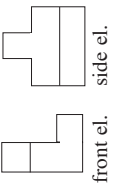
1. (a) 112% (b) 1.12 2. (a) 88% (b) 0.88
3. £200.20 4. £427.50 5. £48.83
6. £297.50 7. £17.38 8. £19,344D

Worksheet 11

D1.1: Understanding scales

1. drawing length = 7.9 (± 0.1 cm)
for actual length, accept 23.4 m ~ 240 m
drawing height = 3.4 cm (± 0.1 cm)
for actual height, accept 99 m ~ 105 m
2. (a) 1 : 4 (b) 1 : 50 (c) 1 : 100 (d) 1 : 250
3. (a) 28 cm (b) 12 cm 4. (a) 14 cm (b) 6 cm
5. (a) 1 cm : 5 m (b) L = 45 m, W = 20 m
6. (a) 10 cm (b) 6.5 cm (c) 4 cm

D1.2: Plans and elevations

1. 
2. 
3. 

D1.3: 3D shapes from plans and elevations

- A: Square based pyramid B: Cylinder
C: Sphere D: Cone
E: Tetrahedron F: Octahedron

Star Challenge Answers

Star Challenge 1A [11-12 correct = 2 stars, 8-10 correct = 1 star]

- 58 rem 3
- 32
- 25 rem 4
- 81 rem 4
- 776
- 217 rem 3
- 45 rem 4
- 228 rem 3
- 77 rem 1
- 129 rem 3
- 109 rem 4
- 124 rem 7

Star Challenge 1B [10-12 correct = 3 stars, 7-9 correct = 2 stars, 4-6 correct = 1 star]

- 24 rem 5
- 128 rem 3
- 151 rem 2
- 35
- 31 rem 1
- 108 rem 6
- 118 rem 3
- 63 rem 10
- 25 rem 8
- 21 rem 1
- 19 rem 3
- 29 rem 34

Star Challenge 1C [14-15 correct = 2 stars, 10-13 correct = 1 star]

- $2\frac{1}{2}$
- $10\frac{1}{2}$
- $1\frac{1}{3}$
- $3\frac{2}{3}$
- $3\frac{1}{2}$
- $4\frac{1}{4}$
- $5\frac{1}{7}$
- $8\frac{2}{6}$
- $4\frac{1}{5}$
- $10\frac{2}{10}$
- $2\frac{1}{7}$
- $4\frac{1}{3}$
- $2\frac{1}{10}$
- $7\frac{4}{5}$
- $2\frac{3}{4}$

Star Challenge 1D [8 correct = 2 stars, 6-7 correct = 1 star]

- 5 each & 2 left over
- $2\frac{1}{3}$
- 5
- 4
- 6
- 3
- 7
- 12
- 7, 7, 7, 8

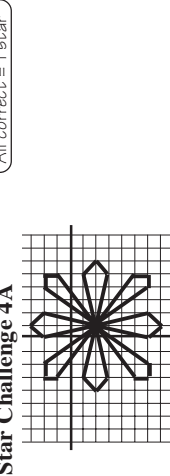
Star Challenge 3A [All correct = 2 stars, 7-8 correct = 1 star]

- A = P B = R C = S D = T
E = O F = X G = Y H = W I = V J = U

Star Challenge 3B [5-6 correct = 1 star]

- 100 000 000
- 8 300 000
- (a) 4 000 000 or 4 million (b) 3 567 000
- (a) 17 000 000 000 or 17 billion
(b) 17 387 000 or 17 387 million

Star Challenge 4A [All correct = 1 star]

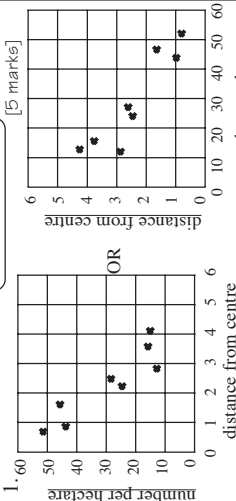


Star Challenge 5A [All correct = 1 star]

1.	Make	
	Ford	Honda
	Vauxhall
	colour	
	silver	
	white	
	red	
	
2.	Grade	
	A* A B C D E F G	
	Boys	
	Girls	

Star Challenge 5B

[8 marks = 2 stars, 6-7 marks = 1 star]



- Negative correlation
- The further you go out from the centre of the city, the less people there are per hectare.

Star Challenge 6A

[14 marks = 2 stars, 10-13 marks = 1 star]

- (a) 40-50 days or around 6 weeks [2 marks]
(b) median = 42; range = 62 [2 marks]
- (a) 35 [1 mark] (b) 97 [1 mark]
- (c) Geometry test : more high marks [2 marks]
(d) Geometry test : 28 students [2 marks]
End-of-year test : 31 students
- (e) Geometry test : 80.5% [2 marks]
End-of-year test : 72% [2 marks]
- (f) 5 students [2 marks]

Star Challenge 6B

[12 marks = 2 stars, 9-11 marks = 1 star]

1.	Fathers' ages	Mothers' ages	Key: 314 = 34
(5)	9 7 6 3 1 3 4 4 6 7 7 8 9 (7)	4 6 7 7 8 9	
(6)	7 3 2 2 1 4 2 2 3 4 6 9 (6)	2 3 4 6 9	
(3)	4 2 0 5 1 3 (2)	0 5 1 3	
(1)	0 0 6 (0)	0 6	

2. Overall, the mothers are younger than the fathers.

Star Challenge 7A

[10 correct = 2 stars, 8-9 correct = 1 star]

- $5\frac{1}{6}$
- $1\frac{1}{8}$
- $3\frac{1}{2}$
- $4\frac{3}{2}$
- $5\frac{1}{2}$
- $4\frac{31}{40}$
- $4\frac{9}{35}$
- $8\frac{43}{50}$
- $9\frac{13}{16}$
- $10\frac{49}{120}$

Star Challenge 8A

[11-12 correct = 1 star]

- F
- T
- T
- T
- T
- F
- T
- T
- T
- F
- T
- T
- F
- T
- F

Star Challenge 8B

[6-7 correct = 1 star, plus clear working = 1 star]

- Task 1: 1. 0.4 2. 0.275 3. $\frac{36}{85}$ 4. 0.79
Task 2: 1. $\frac{5}{6}$ 2. $\frac{3}{4}$ 3. $\frac{5}{7}$

Star Challenge 9A

[8-9 correct = 1 star]

- 21.97
- 7.63
- 43.76
- 4.215
- 3.57
- 49.04
- 11.9
- 8.45
- 12.4

Star Challenge 9B

[8 correct = 2 stars, 6-7 correct = 1 star]

- 7.34
- 20.373
- 8.928
- 43.97
- 24.599
- 28.175
- 122.51
- 1.45

Star Challenge 9C

[6 correct = 2 stars, 4-5 correct = 1 star]

- 15.12 credits
 - 42.24 credits
 - 308.95 euros
 - 69.25 credits
 - 6 641.95 credits
 - 232.56 credits
- Each answer must be accompanied by a clear set of working to be marked correct.

Star Challenge 9D

[4-5 correct = 1 star]

- £31.80
- £11.70
- £3.65
- (a) £48.50 (b) £29.10

Star Challenge 9E

[7 correct = 2 stars, 5-6 correct = 1 star]

- (a) £103 (b) £36.05 (c) £139.05
- £5.40
- £64
- £2.65
- £90.22