Level 7/8 Homework booklet 1

NAME _____

TEACHER _____

Task	Topic	Date Set	Date Completed	☺	☹
1	Multiplying and dividing				
2	Estimating and rounding				
3	Estimating 2				
4	Estimating 3				
5	Use of a Calculator				
6	Mental Questions				
7	Standard Form				
8	Substituting Negative Numbers into Formula				
9	Sequences				
10	Nth term				
11	Complex Calculations (level 8)				
12	Standard Form (4 operations) (level 8)				
13	Standard Form 2 (Estimating) (level 8)				
14	Surds (level 8)				
15	Recurring Decimals (level 8)				

After you have completed each homework self-assess your understanding and the date you completed it

My Maths

Please see back cover for **MyMaths** tasks

Parents

Please read note on back cover

	Numbers	Calculating	Algebra	Shape	Data
8	Recurring Decimals 2	Standard Form Small Standard Form Calcs Standard Form Large Percentage Change 2 Compound Interest Depreciation	Reciprocals Factorising Quadratics 2 Factorising Quadratics 1 Rearranging 2 Recognising Graphs Sketching Quadratics Shading Inequalities Plotting Graphs	Dimensions of Formulae Similar Triangles Trig Missing Angles Trig Missing Sides Trig Angles of Elevation	Box And Whisker Plots Cumulative Frequency 1 Independent Probability The OR Rule Experimental Probability Cumulative Frequency 2 Conditional Probability
7		Significant Figures Dividing Fractions Estimating Calculations Multiplying Fractions Percentage Change 1 Mixed numbers Incomes 1 Incomes 2 Ways of Buying Budgeting Change as a Percentage	Brackets Negative Inequations Inequations Quadratic Sequences Rearranging 1 Sim equations 3 Sim equations 2 Sim equations 1 Simplifying 2 Substitution 2 Simultaneous Negatives Equation of a Line 2	Upper and Lower Bounds 1 Pythagoras Theorem Speed Area of a Trapezium Volume of Cylinders Volume of Prisms Drawing Loci Density Square and Cubic Units	Mean of Grouped Data 1 Median Mode from Freq Table Relative Frequency Sampling Types of Data Questionnaires Line of Best Fit Misleading Graphs Mean from Frequency Tables Mean of Grouped Data 2 Probability Revision Step Graphs Dot Plots

MULTIPLYING AND DIVIDING

Name:

<u>Assessment Criteria:</u> Understand the effects of multiplying and dividing by numbers between 0 and 1

No calculator allowed!

1. Write down three division calculations where the answer is bigger than the starting number

   _____ , _____ , _____

2. Write down two numbers, one of which is between 0 and 1, which multiply to give an answer of 40.

   _____ and _____

3. What number is represented by the '♣' symbol below?

   $$150 \div ♣ = 225$$

   ♣ = _____

4. What is the same about the following four calculations? What is different?

   $$0.8 \div 0.1$$
   $$16 \times 0.5$$
   $$1.6 \div 0.5$$
   $$1.6 \div 0.2$$

5. What is the value of 0.6×0.1?

   _____

Overall, I think my success level is:

Low			High
○	○	○	○

Q	MULTIPLYING AND DIVIDING	☺	☹
	I understand the effect of multiplying by a number between 0 and 1		
	I understand the effect of dividing by a number between 0 and 1		
	I can justify generalisations, arguments or solutions		

I need to practise …

ESTIMATING AND APPROXIMATING

Name:

Assessment Criteria: Make and justify estimates and approximations of calculations; estimate calculations by rounding numbers to one significant figure and multiplying and dividing mentally

No calculator allowed!

1. Find an approximate value of the following calculations:

   a) $\dfrac{192.3 \times 87.1}{26.8 \times 20.7}$

   _____

   b) $\dfrac{2.95 \times 5.1^3}{4.56}$

   _____

   c) $5.92 \times 33 + (2.82 \times 4.8^2)$

   _____

2. Write down an example of a division calculation, involving decimals, that approximates to 60

   _____

3. Is the following statement always true, sometimes true or never true:

   'Rounding up the numbers in a calculation will produce an over-estimate'

   Give reasons for your answer

Overall, I think my success level is:

Low			High
○	○	○	○

Q	ESTIMATING AND APPROXIMATING	☺	☹
	I can round numbers to one significant figure		
	I can calculate mentally once values in a complex calculation have been rounded		
	I can identify efficient approaches, such as cancelling common factors, in order to make mental calculations easier		
	I can justify generalisations, arguments or solutions		

I need to practise …

1) Which one is correct (a) or (b)

	Question	(a)	(b)
A	**4 x 0.8**	3.2	5
B	**5.1 x 0.07**	0.357	72.9
C	**360 x 0.5**	180	720
D	**34 x 0.009**	0.306	3777.8
E	**2 ÷ 0.4**	0.8	5
F	**3 ÷ 0.02**	0.06	150
G	**16 ÷ 0.04**	400	0.64
H	**23 ÷ 0.8**	18.4	2.875
I	$\dfrac{\mathbf{500}}{\mathbf{0.4}}$	200	1250
J	$\dfrac{\mathbf{300}}{\mathbf{0.8}}$	375	240
K	$\dfrac{\mathbf{4}}{\mathbf{1.2 - 0.7}}$	8	2
L	**6 x (2.3 – 1.9)**	2.4	15
M	**0.7 x 0.8**	0.875	0.56
N	$\dfrac{\mathbf{8}}{\mathbf{1.2 - 0.8}}$	3.2	20
O	**0.3 x 23**	76.7	6.9

2) Which of these are true or false? Give a reason for each answer.

a) 5 x 0.2 = 1

b) 6 ÷ 0.4 = 2.4

c) 10 x 0.2 = 50

d) 40 ÷ 0.02 = 2000

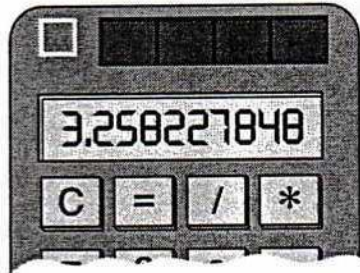e) $\dfrac{8}{0.4} = 20$

f) $\dfrac{7}{1.1 - 0.9} = 1.4$

Task 3 Estimating 2

1)

Lara worked this out on her calculator.

$$\frac{19 \cdot 8 \times 3 \cdot 9}{19 \cdot 8 - 3 \cdot 9}$$

This is what her calculator showed.


```
3.258227848
```

Write down a calculation Lara could do in her head to check whether her answer is correct.

2)

Estimate.

$$\frac{\sqrt{26} \times 1 \cdot 84}{0 \cdot 48}$$

3)

Estimate the answer to this calculation.
Show clearly the values you use.

$$\frac{\sqrt{143 \cdot 7}}{0 \cdot 49}$$

4)

Estimate the answer to this calculation.
Show clearly the values you use.

$$\frac{19 \cdot 7 \times 7 \cdot 9}{0 \cdot 48}$$

5)

Jim has done this calculation.
His answer is wrong.

Explain how you can tell the answer is wrong without working it out exactly.

$$58\,900 \div 62 = 95$$

6)

Estimate the answer to this calculation.
Show clearly the values you use.

$$\frac{9 \cdot 6^2}{0 \cdot 47}$$

7)

Estimate the answer to this calculation.
Show clearly the values you use.

$$\frac{\sqrt{143 \cdot 7}}{0 \cdot 49}$$

8)

Two of these calculations are wrong.

Which two are wrong?

Explain how you can tell that they are wrong **without** doing the calculation.

(a) $15 \times 1 \cdot 7 = 25 \cdot 5$

(b) $0 \cdot 6 \times 12 = 21$

(c) $27 \div 45 = 0 \cdot 6$

(d) $25 \div 18 = 0 \cdot 8$

Task 4 Estimating (3) exam questions

1)

State whether or not this calculation is correct.

$$18 \cdot 2 \div 0 \cdot 91 = 200$$

Show how you decided.

The calculation is .... because ....

....

....[2]

2)

The answers to these calculations are wrong.
Explain why the answers are wrong.
Do **not** do the full calculation.

(a) $23 \cdot 4 \times 1 \cdot 1 = 22 \cdot 74$

....

.... [1]

(b) $\dfrac{54 \cdot 6}{0 \cdot 4} = 21 \cdot 84$

....

.... [1]

3)

Sam and Michael were comparing their mathematics homework.
They had different answers to one of the questions.

$$\frac{2 \cdot 31}{1 \cdot 1 - 0 \cdot 4} = 3 \cdot 3$$

Sam's work

$$\frac{2 \cdot 31}{1 \cdot 1 - 0 \cdot 4} = 1 \cdot 7$$

Michael's work

Explain how you can tell which one is wrong without doing the full calculation.

....is wrong because ....

....

.... [2]

4)

State whether or not this calculation is correct.

$$18 \cdot 2 \div 0 \cdot 91 = 200$$

Show how you decided.

The calculation is .... because ....

....

....[2]
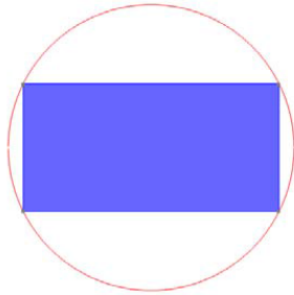
USE OF A CALCULATOR

Name:

Assessment Criteria: Use a calculator efficiently and appropriately to perform complex calculations with numbers of any size, knowing not to round during intermediate steps of a calculation

1. The diagram below shows a 3 cm by 6 cm rectangle inscribed in a circle. What is the area of the circle?

_____cm^2

2. What is the same/different about the following:

a) $\dfrac{3.9 - 4.5}{2.5}$

b) $(-2.4)^3$

c) $\dfrac{3 \times 0.2^2}{0.8 \times 0.9 - 0.22}$

d) $(-4.8)^2$

Overall, I think my success level is:

Low   High
○ ○ ○ ○

Q	USE OF A CALCULATOR	☺	☹
	I can use my calculator to carry out calculations involving π		
	I can use my calculator to carry out calculations involving brackets		
	I can use my calculator to carry out calculations involving powers		
	I can use my calculator to carry out calculations written as a fraction		
	I can use my calculator to carry out calculations involving combinations of these things		
	I know when it is appropriate to round when carrying out a complex calculation		
	I can justify generalisations, arguments or solutions		

I need to practise …

This decimal number line shows three dividers that are **equidistant** between 0 and 1.
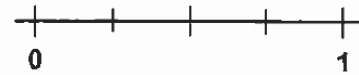
(For the following questions, draw a decimal number line to help you.)

Levels
6 - 7

1) Find three numbers that are of equal distances between 3 and 4.

2) Find three numbers that are of equal distances between 0.1 and 0.2.

3) Find seven numbers that are of equal distances between 1 and 2.

Level 7 question

Each of these calculations has the same answer, 60. Fill in each gap with a number.

2.4 x 25	60 ÷ 1

= 60

0.24 x	6 ÷ ......
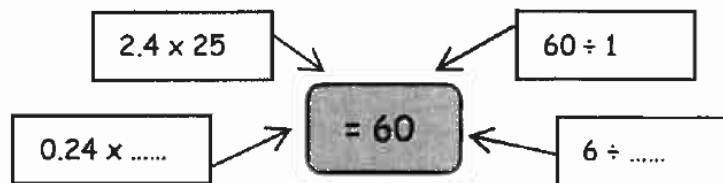
2 marks

Level 7 question - Write the missing numbers in these multiplication grids.

a)

×	8	
9	72	
-6		30

b)

×	0.2	
3		1.2
		6

3 marks

Level 8 question – Write a number in each box to make the inequalities true.

a) ☐ ÷ ☐ < **-1**

1 mark

b) **-1** < ☐ ÷ ☐ < **0**

1 mark

Level 7 Questions

1. A three-digit number is multiplied by a two-digit number. How many digits could the answer have? Write the minimum number and the maximum number of digits that the answer could have. You must show your working.   2 marks

2. Look at these number cards.

| 0.2 | 2 | 10 | 0.1 | 0.05 | 1 |

a) Choose the two cards which give the lowest possible answer when they are multiplied.

_____ x _____ =   2 marks

b) Choose the two cards that give the answer 100 when divided.

_____ ÷ _____ =   1 mark

7	▪ 0.034 × 0.046

Task 7 Standard Form

1. Write these in standard form

3000000 = _____

40000 = _____

523000 = _____

254100000 = _____

1829000000 = _____

102320000000000 = _____

143.2 = _____

2.Write these as normal numbers

6×10^7 = _____

3×10^9 = _____

6.2×10^5 = _____

7.12×10^8 = _____

4.356×10^{12} = _____

1.234×10^6 = _____

3.245×10^2 = _____

3) Write these as normal numbers

a 6×10^{-7}

b 3×10^{-10}

c 4×10^{-11}

d 7×10^{-1}

e 3.664×10^{-15}

f 3.93×10^{-17}

g 4.609×10^{-13}

h 4.966×10^{-3}

i 3.88543×10^{-2}

j 3.05×10^{-7}

4) Write these in standard form

a   0.09

b   0.00000000000008

c   0.00000000004

d   0.000000000000000006

e   0.0000000006699

f   0.000000594

g   0.0000000000000000003055

h   0.00000000145

i   0.0000000872

j   0.00000986

5) The earliest dinosaurs existed on earth 2.05 $\times 10^8$ years ago.
Dinosaurs became extinct 6.5 $\times 10^7$ years ago.
For how long did dinosaurs exist on earth?

6)

The distance between the Moon and the Earth is 384 400 km.
(a) Write this distance in standard form.
(b) A total eclipse of the Sun occurred in August 1999 when the Earth, the Moon and the Sun were in a straight line.

NOT TO SCALE

●   ●   ●

Earth   Moon   Sun

The distance between the Earth and the Sun is 1.496×10^8 km.
Find the distance between the Moon and the Sun at the time of the eclipse.
Give your answer in standard form.

Task 8 Substituting negative values in formula

A)
If $a = -3$ $b = 5$ $c = 12$ $d = 2$ match the expression to the correct value

Expression		Value
$6b$		1
$\dfrac{c}{d}$		3
$a + 14$		6
b^2		-12
bd		7
$4a$		2
$3b^2$		1
$b^3 + 100$		-9
a^2		225
$a - 6$		9
$\dfrac{a + b}{d}$		1
$2a^2$		0
$c + 4a$		1

B) If $x = -3$ $y = -4$ $z = 3$ $w = 12$ fill in the missing boxes

$B = \dfrac{w}{7}$

$G = 5z + 2w$

$L = z^4$

$V = 20 - 2y$

$K = w^2$

$S = xw$

$M = x^2$

$N = x + y$

$H = 2(w + y)$

$J = 4z^2$

$D = 4x$

$C = y + 6$

$R = 3y^2$

$A = 5z$

$T = 2(w - y)$

$F = w + x$

$P = z - y$

$E = x - z$

$Q = x - y$

$U = 3(2w + 5y)$

A	B	C	D
E	F	G	H
J	K	L	M
N	P	Q	R
S	T	U	V

SEQUENCES

Name:

Assessment Criteria: Find the next term and n^{th} term of quadratic sequences and functions and explore their properties

1. Find the first three terms of the sequence with an nth term of $T(n) = 2n^2 - 7$

_____, _____, _____

2. Find the nth term of each of these sequences:

   a) -3, 0, 5, 12, 21, ...

   $T(n) =$ _____

   b) $\dfrac{1}{2}, \dfrac{1}{6}, \dfrac{1}{12}, \dfrac{1}{20}, \dfrac{1}{30}, \ldots$

   $T(n) =$ _____

3. Find a way to continue a sequence starting 1, 2, ... so that it has a quadratic n^{th} term. Explain your answer.

4. Decide whether each of the following statements is always true, sometimes true, or never true. Explain your answer in each case.

   a) Sequences with an equivalent second difference have a quadratic n^{th} term

b) Sequences with an unequal first difference pattern have a quadratic n^{th} term

c) The second difference for a quadratic sequence is always 2

Overall, I think my success level is:	Low High ○ ○ ○ ○

Q	SEQUENCES	☺	☹
	I can find the terms of a quadratic sequence given its nth term		
	I can find the nth term of a quadratic sequence		
	I can find the nth term of a sequence that is connected to a quadratic rule		
	I know some of the properties of quadratic sequences		
	I can justify generalisations, arguments or solutions		

I need to practise …

Task 10 nth Term

Level 7 question

3. (a)   Draw lines to match each *n*th term rule to its number sequence.

*n*th term   Number sequence

| 4*n* |

| 4, 7, 12, 19, ... |

| $(n + 1)^2$ |

| 4, 8, 12, 16, ... |

| $n^2 + 3$ |

| 4, 9, 16, 25, ... |

| $n(n + 3)$ |

| 4, 10, 18, 28, ... |

2 marks

(b)   Write the first four terms of the number sequence using the *n*th term rule below.

| $n^3 + 3$ |————| ____ , ____ , ____ , ____ |

2 marks

Level 8 question - Each pattern below shows a square grid that is 2 squares high. Only one square at each end of the top row is shaded. All squares in the bottom row are shaded.
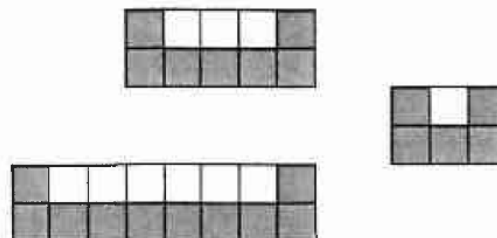
Imagine one of these patterns that has n squares in the bottom row. Write an expression for the fraction of the pattern that is shaded.   2 marks

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| **7** | • Find the nth term for the following sequence: 2×3, 3×4, 4×5, 5×6, ... |
| | • Find the nth term for the following sequence: $\dfrac{1}{2}, \dfrac{1}{6}, \dfrac{1}{12}, \dfrac{1}{20}, \dfrac{1}{30}, ...$ |

Name:

<u>Assessment Criteria:</u> Solve problems involving calculating with powers, roots and numbers expressed in standard form, checking for correct order of magnitude and using a calculator as appropriate

1. a) Use your calculator to work out $(2.3 \times 10^5) \times (5 \times 10^2)$

   _____

   b) Use the index laws to work out $(2.3 \times 10^5) \times (5 \times 10^2)$

   _____

   c) Explain why your answers to (a) and (b) are equivalent

   _____

   _____

   _____

2. The diagram below shows a 3 cm by 6 cm rectangle inscribed in a circle. What is the area of the circle?
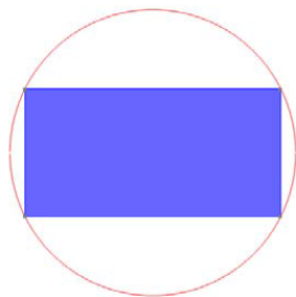
   _____cm^2

3. Mercury orbits the sun in 88 days at an average speed of 1.72×10^6 kmh^{-1}.
Pluto orbits the sun in 249 years at an average speed of 1.71×10^4 kmh^{-1}.
Assuming that their orbits are circles centred on the sun, what is the least distance between them at any time?

_____km

NB: In reality, the orbits are not circles!

Overall, I think my success level is:

Low ⬤ ⬤ ⬤ ⬤ High

Q	COMPLEX CALCULATIONS	☺	☹
	I know the index laws		
	I can calculate with powers and roots, including using the index laws		
	I can calculate with numbers written in standard form		
	I can check solutions for the correct order of magnitude		
	I can use a calculator when appropriate		
	I can develop and follow alternative methods and approaches		
	I can select and combine known facts and problem solving strategies to solve problems of increasing complexity		

I need to practise …

Task 12 Standard Form 1

1) Leave your answer in standard form

a)

$(8\cdot4 \times 10^4) + (6 \times 10^3).$

b)

$(2\cdot4 \times 10^2) + (1\cdot6 \times 10^3)$

c)

$2 \times 10^{-3} + 4 \times 10^{-4}$

d)

$1\cdot7 \times 10^5 + 3\cdot4 \times 10^4$
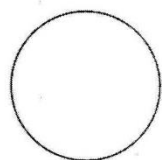
e)

$(8 \times 10^3) + (3 \times 10^2)$

f)

$(3\cdot4 \times 10^{-2}) + (4\cdot7 \times 10^{-3})$

2)

The population of Asia is $2\cdot69 \times 10^9$
The population of Africa is $5\cdot11 \times 10^8$

What is the difference in population between Asia and Africa?

Not to scale

Sun   Mercury   Neptune

Mercury is $5\cdot8 \times 10^7$ km from the Sun.
Neptune is $4\,497\,000\,000$ km from the Sun.

How far is Neptune from Mercury?
Give your answer in standard form.

3)

Lottery Prize Money
Week ending March 5th

Wednesday Jackpot
£$2\cdot4 \times 10^6$
Saturday Jackpot
£$1\cdot9 \times 10^7$

What was the total Jackpot prize money for the week ending March 5th?
Give your answer in standard form.

4)

5)

The number of passengers using Gatwick Airport in January was $2\cdot1 \times 10^6$.
For the same month, the number of passengers using Glasgow Airport was $5\cdot0 \times 10^5$.

How many more passengers used Gatwick Airport than Glasgow Airport?
Give your answer in standard form.

6)

The table below shows the population and land area of China and the UK.

	Population	Land area (km^2)
China	$1\cdot32 \times 10^9$	$9\cdot64 \times 10^6$
UK	$6\cdot16 \times 10^7$	$2\cdot45 \times 10^5$

(a) Calculate the difference between the land areas of China and the UK.

(b) Find the total population of China and UK

7)

The population of China is estimated to be $1\,200\,000\,000$.

(a) Write this population in standard form.

(b) The population of the UK is estimated to be 6×10^7.
Rebecca says that the population of China is about 200 times the population of the UK.

Explain why she is wrong.

Task 13 Standard Form 2 Estimating

A) Estimate the answers to these. Give your answers in standard form.

1) $(4.6 \times 10^6) \times (8.1 \times 10^2)$

2) $(9.2 \times 10^7) \div (2.9 \times 10^3)$

3) $(6.1 \times 10^{11}) \div (3.382 \times 10^8)$

4) $\dfrac{(7.9 \times 10^3) \times (4.1 \times 10^5)}{1.81 \times 10^4}$

5) $\dfrac{(6.33 \times 10^5) \times (8.1 \times 10^7)}{(2.1 \times 10^3) \times (2.9 \times 10^4)}$

B) Estimate the answers to these. Give your answers in standard form.

1) $\dfrac{7 \cdot 8 \times 10^5}{2 \cdot 1 \times 10^3}$

2) $\dfrac{8 \cdot 2 \times 10^{-3}}{3 \cdot 85 \times 10^3}$

3) $\dfrac{(4 \cdot 16 \times 10^{-2}) \times (3 \cdot 12 \times 10^9)}{5 \cdot 89 \times 10^4}$

4) $\dfrac{(5 \cdot 91 \times 10^6) \times (2 \cdot 035 \times 10^{-2})}{(3 \cdot 112 \times 10^2)}$

5) $\dfrac{2 \cdot 8 \times 10^8}{9 \cdot 4 \times 10^6}$

6) $(1 \cdot 8 \times 10^5) \times (4 \cdot 3 \times 10^{-3})$

C) Checking …..

1)

Use **estimation** to decide whether or n

$\dfrac{(3 \cdot 6 \times 10^2) \times (9 \cdot 1 \times 10^{-4})}{6 \cdot 3 \times 10^{-2}} = 5 \cdot 2 \times$

Show how you decide.

2)

Use estimation to decide whether or not the answer to this calculation could be correct. Explain your answer clearly.

$\dfrac{2 \cdot 56 \times 10^5}{5 \cdot 82 \times 10^{-2}} = 4 \cdot 3986 \times 10^2$

3)

Sam and Michael are comparing their homework.

Sam
$(3 \cdot 2 \times 10^2) \times (9 \cdot 5 \times 10^{-3}) = 304$

Michael
$(3 \cdot 2 \times 10^2) \times (9 \cdot 5 \times 10^{-3}) = 3 \cdot 04$

Who has the correct answer?
Use **estimation** to show how you decide.
Show clearly the values you use.

…………………………………………………. is right because the correct answer is approximately ………….

4)

In 2007, the average carbon footprint per household per year in the UK was $2 \cdot 96 \times 10^4$ kg of carbon dioxide.

The number of households in the UK in 2007 was $25 \cdot 1$ million.

Estimate the total carbon footprint for all of the households in the UK for the year 2007. Give your answer in standard form.

5)

A molecule of water has mass 3×10^{-23} g.

Calculate the mass of 5 million molecules of water. Give your answer in standard form.

C) Harder problems

1)

Estimate.

$\sqrt{\dfrac{502 \times 6180}{324}}$

2)

Each of these calculations is wrong.
Show clearly, without working out the exact answer, how you can tell that they are wrong.

(a) $\dfrac{4 \cdot 1 + 4 \cdot 7}{0 \cdot 9 \times 0 \cdot 8} = 6 \cdot 336$

(b) $\dfrac{(3 \cdot 1 \times 10^2) \times (6 \cdot 3 \times 10^3)}{2 \cdot 1 \times 10^{-3}} = 930$

3)

Each of the following calculations is wrong.

Show clearly, without working out the exact answer, how you can tell they are wrong.

(a) $\dfrac{32 \cdot 03}{9 \times 0 \cdot 1} = 29 \cdot 7$

(b) The area of a circle of radius 10 cm is 295 cm².

4)

The total world land area is $5 \cdot 8 \times 10^7$ square miles, correct to 2 significant figures.
The land area of Australia is $2 \cdot 9 \times 10^6$ square miles, correct to 2 significant figures.

Estimate the percentage of the total world land area covered by Australia. Show your working clearly.

Task 14 Surds

A) Work out these

1) $\sqrt{7} \times \sqrt{7}$

2) $\sqrt{17} \times \sqrt{17}$

3) $\sqrt{2} \times \sqrt{50}$

4) $\sqrt{3} \times \sqrt{5}$

5) $5\sqrt{3} \times 4\sqrt{3}$

6) $6\sqrt{7} \times 2\sqrt{7}$

> Eg simplify $3\sqrt{5} \times 4\sqrt{5}$
> $= 12 \times \sqrt{5} \times \sqrt{5} = 12 \times 5 = 60$

B) Simplify

1) $\sqrt{2}(5 + \sqrt{2})$

2) $\sqrt{5}(10 - 2\sqrt{5})$

3) $2\sqrt{3}(4\sqrt{3} - 2)$

> Eg simplify $\sqrt{3}(4 - \sqrt{3})$
> $= 4\sqrt{3} - \sqrt{3}\sqrt{3} = 4\sqrt{3} - 3$

C) Simplify

1) $\sqrt{5} + 2)(\sqrt{5} + 3)$

2) $(\sqrt{3} - 4)^2$

3) $(3 + 3\sqrt{2})(4 - 5\sqrt{2})$

> Eg simplify $(2 + \sqrt{3})^2$
>
> | x | 2 | $+\sqrt{3}$ |
> |---|---|---|
> | 2 | 4 | $2\sqrt{3}$ |
> | $+\sqrt{3}$ | $2\sqrt{3}$ | 3 |
>
> $= (2 + \sqrt{3})^2$
> $= 4 + 2\sqrt{3} + 2\sqrt{3} + 3$
> $= 7 + 4\sqrt{3}$

D) Rationalise the denominator

1) $\dfrac{20}{\sqrt{5}}$

2) $\dfrac{21}{\sqrt{7}}$

3) $\dfrac{3 + \sqrt{3}}{\sqrt{3}}$

> Eg simplify $\dfrac{10}{\sqrt{2}} = \dfrac{10}{\sqrt{2}} \times \dfrac{\sqrt{2}}{\sqrt{2}} = \dfrac{10\sqrt{2}}{\sqrt{2} \times \sqrt{2}} = \dfrac{10\sqrt{2}}{2} = 5\sqrt{2}$

E) Simplify

a) $\sqrt{12}$

b) $\sqrt{50}$

c) $\sqrt{63}$

> Eg simplify $\sqrt{75}$
> $= \sqrt{25 \times 3} = \sqrt{25} \times \sqrt{3} = 5\sqrt{3}$

d) $\sqrt{2} + \sqrt{18}$

e) $\sqrt{7} + \sqrt{28}$

> Eg simplify $\sqrt{3} + \sqrt{48}$
> $= \sqrt{3} + \sqrt{16 \times 3} = \sqrt{3} + \sqrt{16} \times \sqrt{3} = \sqrt{3} + 4\sqrt{3} = 5\sqrt{3}$

F) Exam Questions

1)
(a) Express $5\sqrt{27}$ in the form $n\sqrt{3}$, where n is a positive integer.

(b) Rationalise the denominator of $\dfrac{21}{\sqrt{3}}$

2)
Expand and simplify $(3 + \sqrt{2})^2$

Give your answer in the form $a + b\sqrt{2}$ where a and b are integers.

3)
Rationalise the denominator $\dfrac{3}{\sqrt{7}}$

4)
(a) Rationalise the denominator of $\dfrac{15}{\sqrt{5}}$

$(1 + \sqrt{3})^2$ can be written in the form $a + b\sqrt{3}$, where a and b are integers.

(b) Work out the value of a and the value of b.

Task 15 Recurring Decimals

A) Change these to fractions in simplest form. Show your working out

1) $0.\dot{7}\dot{8}$

2) $0.4\dot{3}\dot{2}$

3) $0.4\dot{8}$

4) $0.\dot{2}3\dot{1}$

5) $0.4\dot{7}$

6) $0.7\dot{3}\dot{2}$

> *Write* $0.\dot{8}\dot{4}$ *as a fraction in simplest form*
>
> x $= 0.\dot{8}\dot{4}$ $=$ *0.8484848484*
>
> *100x*   *= 84.8484848484*

H) Change to recurring decimals by long division.

1) $^{11}/_{15}$

2) $^{7}/_{12}$

I)

Terminating	Recurring

Put these fractions in the correct columns

$^5/_8$ $^1/_7$ $^{12}/_{11}$ $^{13}/_{16}$ $^{41}/_{60}$

$^{27}/_{100}$ $^3/_{26}$ $^7/_{30}$ $^{19}/_{25}$ $^3/_{40}$

$^5/_{32}$ $^2/_3$ $^4/_{13}$ $^{31}/_{32}$ $^{37}/_{45}$

$^{33}/_{200}$ $^5/_{22}$ $^7/_{15}$ $^{19}/_{20}$ $^{21}/_{80}$

J)

What is the rule for a fraction being a recurring decimal?

K) What fraction is equal to (write in simplest form)

1) 0.875

2) 0.45

MyMaths : Here are the MyMaths tasks for **level 7**.

Your teacher will instruct which of these to do.

Alternatively can use MyMaths to help with topics you are unsure of and to revise topics.

BOOSTER PACKS LEVEL 7

Topic	*How to find :* Go to **Boosters** then	% Scored	Self Assessment		
Arithmetic	Ds to C's (Booster Pack)		☺	☺	☹
Number and Powers	Ds to C's (Booster Pack)		☺	☺	☹
Decimals	Ds to C's (Booster Pack)		☺	☺	☹
Sequences, Formula	Ds to C's (Booster Pack)		☺	☺	☹
Coordinates, Graphs	Ds to C's (Booster Pack)		☺	☺	☹

OTHER LEVEL 7

Topic	*How to find :* Go to **Library** then	% Scored	Self Assessment		
Significant Figures	Number → Estimation and Accuracy		☺	☺	☹
Estimating Calculations	Number → Estimation and Accuracy		☺	☺	☹
Upper and Lower Bounds 1	Number → Estimation and Accuracy		☺	☺	☹
Indices 1	Number → Powers and roots		☺	☺	☹
Equation of a Line 2	Number → Graphs		☺	☺	☹
Quadratic Sequences	Number → Sequences		☺	☺	☹

Here are the MyMaths tasks for **level 8**.

BOOSTER PACKS L8

Topic	*How to find :* Go to **Boosters** then	% Scored	Self Assessment		
Arithmetic	Cs 2 Bs (Booster Pack)		☺	☺	☹
Standard Form	Cs 2 Bs (Booster Pack)		☺	☺	☹
Sequences, Formula	Cs 2 Bs (Booster Pack)		☺	☺	☹
Graphs	Cs 2 Bs (Booster Pack)		☺	☺	☹

OTHER LEVEL 8

Topic	*How to find :* Go to **Library** then	% Scored	Self Assessment		
Recurring Decimals 2	Number → Decimals		☺	☺	☹
Upper and Lower Bounds 2	Number → Estimation and Accuracy		☺	☺	☹
Indices 2	Number → Powers and roots		☺	☺	☹
Indices 3	Number → Powers and roots		☺	☺	☹
Surds 1	Number → Powers and roots		☺	☺	☹
Standard Form Large	Number → Standard Form		☺	☺	☹
Standard Form Small	Number → Standard Form		☺	☺	☹
Standard Form Calcs	Number → Standard Form		☺	☺	☹
Plotting Graphs	Number → Graphs		☺	☺	☹
Recognising Graphs	Number → Graphs		☺	☺	☹
Sketching Quadratics	Number → Graphs		☺	☺	☹
Shading Inequalities	Number → Inequailities		☺	☺	☹

Parent note about this booklet

This booklet contains several level tasks available for homework along with MyMaths tasks.

The teacher will instruct which level tasks students should complete each week.

Students can do extra MyMaths tasks not set by the teacher at any time It is not intended

that the whole booklet should be completed as one homework.

The booklet must be kept safely and any lost booklets will require £1 for a new copy.