6 Number System

6.1 Decimals

1. Write each of the following as a decimal.

(a) $\frac{7}{10}$ (b) $\frac{27}{100}$ (c) $\frac{2}{10}$ (d) $\frac{401}{1000}$

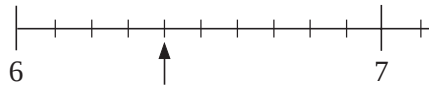
(e) $\frac{15}{100}$ (f) $\frac{15}{1000}$ (g) $\frac{43}{100}$ (h) $\frac{999}{1000}$

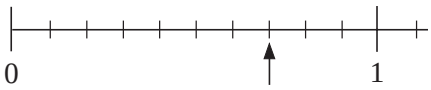
2. Write each of the following as a fraction.

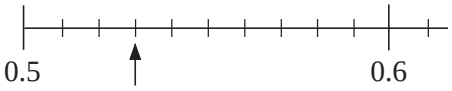
(a) 0.6 (b) 0.37 (c) 0.07 (d) 0.219

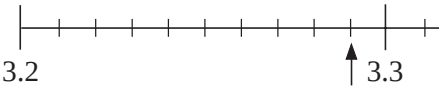
(e) 0.001 (f) 0.999 (g) 0.093 (h) 0.55

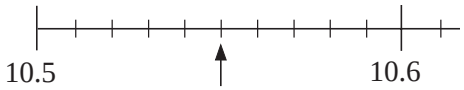
3. Read the value indicated by each pointer

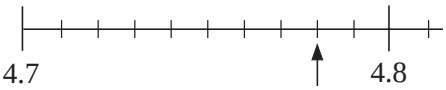
(a)


(b)


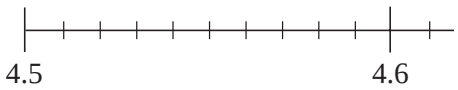
(c)


(d)


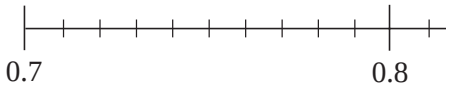
(e)


(f)


4. Copy each scale three times and indicate with a pointer each of the numbers given.

(a)


(i) 4.52
(ii) 4.57
(iii) 4.555

(b)


(i) 0.75
(ii) 0.79
(iii) 0.705

5. Calculate

(a) 4.2 − 3.1 (b) 5.6 + 2.7 (c) 7.4 + 9.7

(d) 21.3 + 32.4 (e) 46.5 + 21.6 (f) 39.8 + 38.9

(g) 27.3 + 62.4 + 10.3 (h) 4.2 − 3.1 (i) 5.6 − 2.4

(j) 9.2 − 7.4 (k) 8.3 − 2.5 (l) 25.6 − 12.2

(m) 47.7 − 24.5 (n) 86.4 − 37.5 (o) 73.2 − 45.6

(p) 5.22 + 3.45 (q) 3.65 + 4.17 (r) 4.37 + 2.75

(s) 21.42 + 37.23 (t) 74.56 + 19.58

6. (a) Convert the following amounts in pence to £s.

(i) 57 p (ii) 214 p (iii) 7002 p (iv) 47631 p

(b) Convert the following amounts in £s to pence.

(i) £2.99 (ii) £0.07 (iii) £521 (iv) £345.27

7. Find a decimal number between

(a) 4.5 and 4.6 (b) 0.49 and 0.50 (c) 12.2 and 12.3

(d) 75.37 and 75.38

8. Put these decimal numbers in ascending order.

1.47, 1.4, 1.7, 1.471, 1.444, 1.4747

9. Felix has 8.5 m of model railway track and Gerry has 6.6 m.

(a) What is the total length of their track?

(b) They sell 4.7 m of the total length of their track. What length of track is left?

(SEG)

10. The Robinson family (2 adults and 2 children) are members of *Parkmead Leisure Centre.*

SWIMMING PRICES

	Members	*Non-Members*
Adults	£1.50	£2.00
Children	£1.20	£1.50

(a) How much in total do the Robinson family have to pay for a swim?

(b) How much less do the Robinson family pay as members for a swim, than they would if they were non-members?

(c) A family ticket for membership costs £25.

What is the minimum number of times that the Robinson family would have to go swimming if they were to save money on their family ticket?

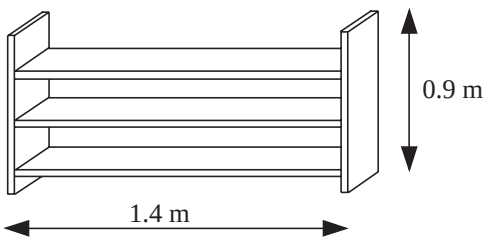
(SEG)

11. Fatima is making a shelf unit as shown.

She needs three pieces of wood, each of length 1.4 m, for the shelves.

She needs two pieces of wood, each of length 0.9 m, for the ends.

The wood is sold only in 3 m lengths.



Calculate how many 3 m lengths Fatima needs to buy.

(SEG)

12. A sports shop keeps information about sports shoes on a database.
Part of this database is shown below.

Model	Manufacturer	Cost
Flyer	Tiger	£39.99
Racer	Cheetah	£37.29
Runner	Cheetah	£35.99
Strider	Tiger	£48.99
Blinder	Lion	£33.49
Sprinter	Leopard	£49.99

(a) Write down the name of the manufacturer of the cheapest shoe.

(b) How much dearer is the *Strider* than the *Racer*?

(LON)

13. Six girls competed in the long jump at their school Sports Day. Their best jumps were as follows.

Anne	6.08 m	Donna	6.12 m
Beth	5.93 m	Emma	5.98 m
Candy	5.87 m	Fatima	m

(a) Fatima finished in second place.
Write down a possible length for Fatima's jump.

(b) Arrange the six competitors in order of merit.

(c) Write down the length of Anne's jump in centimetres.

(MEG)

14. 39 members of Arwick Youth Club went on an outing to a leisure centre.
They went in minibuses which could seat up to 15 members.

(a) (i) How many minibuses were needed?

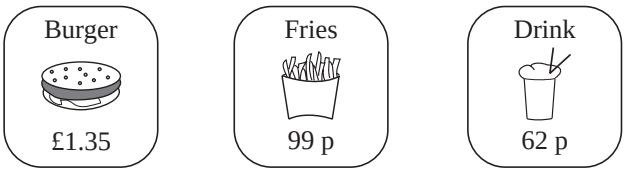
(ii) How many spare seats were there?

The transport costs were £90 altogether. They also had to pay £150 for the group to use the leisure centre.

(b) Jo collected £6.50 from each passenger to pay for this.
How much was left over?

(OCR)

15.



(a) (i) Arnie orders a burger and fries. How much does this cost?

(ii) He pays with a £5 note. How much change does he get?

(b) A 'Meal Deal' gives a burger, fries and drink for £2.50.
How much cheaper is this than buying the items separately?

(AQA)

6.2 Multiplying and Dividing with Decimals

1. Without using a calculator, find

(a)	$2.5 \div 10$	(b)	4.57×100	(c)	2.13×10
(d)	9.5×1000	(e)	15.241×100	(f)	0.57×10
(g)	92×100	(h)	7.93×1000	(i)	2.114×100
(j)	0.221×100	(k)	0.0049×1000	(l)	0.078×100

2. Without using a calculator, find

(a)	$2.47 \div 10$	(b)	$22.5 \div 10$	(c)	$476.9 \div 100$
(d)	$0.01 \div 10$	(e)	$100.2 \div 100$	(f)	$99 \div 100$
(g)	$526.4 \div 100$	(h)	$9748 \div 1000$	(i)	$9748 \div 100$
(j)	$27.49 \div 100$	(k)	$0.109 \div 100$	(l)	$4000 \div 10\,000$

3. The Williamson family went into a café. The table shows what they ordered.

	Cost £ . p
Three cans of cola at 63 pence each	1 . 89
Two cups of tea at 54 pence each	
Five buns at 32 pence each	
Total cost	

(a) Copy and complete the table.

Mr. Williamson paid the bill with a £10 note.

(b) How much change did he get?

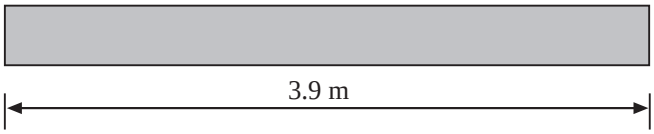
(LON)

4.

These notices were seen on two market stalls.
At which stall was the price of one orange cheaper and by how much?

(MEG)

5. Fencing rails are 3.9 metres long.



How many rails are needed for a fence 200 metres long?

(SEG)

6. Tom earns a basic weekly wage of £180 for 36 hours work.

   (a) How much does Tom earn for one hour at the basic rate?

   (b) Overtime pay is one and a half times the basic rate.
   How much is Tom paid for one hour of overtime?

   (c) Overtime is paid for each hour over the basic 36 hours.
   How much does Tom earn if he works 43 hours in one week?

(SEG)

7. Jane's classroom is rectangular.

   She measures the length and width of the floor.
   The length is 6.73 m. The width is 5.62 m.

   (a) Calculate the area of the classroom floor.
   Write down all the figures in the answer shown on your calculator.

   (b) (i) The classroom is to be carpeted.
   Give your answer to part (a) to an appropriate degree of accuracy.

   (ii) Explain why you chose this degree of accuracy.

(SEG)

6.3 Fractions and Decimals

1. Write each of the following correct to 1 decimal place.

(a)	3.14	(b)	5.67	(c)	385.28	(d)	9.942
(e)	8.01	(f)	145.97	(g)	0.521	(h)	0.062

2. Write each of the following correct to 2 decimal places.

(a) 0.089 (b) 6.315 (c) 0.802 (d) 12.989

(e) 4.999 (f) 0.007 (g) 1.002 (h) 52.436

3. Write all the numbers in Question 1, correct to

(i) 2 significant figures (ii) 1 significant figure.

4. Write each of the following as exact decimal equivalents.

(a) $\frac{3}{8}$ (b) $\frac{1}{4}$ (c) $\frac{4}{5}$ (d) $\frac{7}{8}$

(e) $\frac{1}{5}$ (f) $\frac{3}{4}$ (g) $\frac{1}{8}$ (h) $\frac{5}{8}$

5. Write each of the following as decimals, correct to 3 decimal places.

(a) $\frac{2}{3}$ (b) $\frac{1}{6}$ (c) $\frac{2}{7}$ (d) $\frac{1}{11}$

(e) $\frac{2}{9}$ (f) $\frac{1}{3}$ (g) $\frac{5}{6}$ (h) $\frac{1}{7}$

6. Copy and complete the table below, putting on the equivalent fractions, decimals and percentages.

Proportion	**Fraction**	**Decimal**	**Percentage**
one tenth	$\frac{1}{10}$		
			25%
		0.3	
three eighths			
	$\frac{1}{2}$		
		0.625	
three quarters			
	$\frac{4}{5}$		

6.4 Long Multiplication and Division

1. Without using a calculator, find

(a)	21×17	(b)	32×14	(c)	26×33
(d)	31×104	(e)	47×25	(f)	72×214
(g)	17×1147	(h)	312×274	(i)	45×940

2. Without using a calculator, find

(a)	$504 \div 4$	(b)	$120 \div 20$	(c)	$1008 \div 8$
(d)	$414 \div 23$	(e)	$496 \div 32$	(f)	$756 \div 21$
(g)	$7525 \div 35$	(h)	$1323 \div 49$	(i)	$24849 \div 99$

3. A Maths teacher buys 92 text books, costing £3.85 each.
Without using a calculator, work out the *exact* total cost.

(MEG)

4. A group of 24 teachers wins £2.7 milion on the National Lottery.
Without using a calculator, find out how much each gets in £s if the money is shared equally.

5. 17 tickets cost £21.25. If they all cost the same, find, without using a calculator, the cost of one ticket.

6. The cost of a calculator is £6.79.
   (a) Work out the cost of 28 of these calculators.

   A college wants to buy 570 calculators. They are sold in boxes of 50.
   (b) Work out the number of boxes the college should buy.

   The college decides to increase its order of calculators by 10%.
   (c) Increase 570 by 10%.

(Edexcel)

7. Watcham has a population of 86 000 in an area of 104 square miles.
To meet housing targets, it needs to aim to house an extra 14 000 people whilst increasing the area by only 6 square miles.
If this happens, by how much will the population density have increased?

(OCR)

6.5 Estimating Answers

1. Express each of the following correct to 3 significant figures:

(a)	96.63	(b)	316.5	(c)	1.940 5
(d)	0.004 681	(e)	50.92	(f)	0.000 604 8
(g)	0.040 713	(h)	5.984	(i)	26.98

2. Write each of the following correct to the number of significant figures (s.f.) indicated.

(a) 308.637 (4 s.f.) (b) 0.099 8 (1 s.f.)

(c) 420.65 (3 s.f.) (d) 0.004 307 (2 s.f.)

3. Write 13.004 72 correct to

(a) 5 s.f. (b) 4 s.f. (c) 2 s.f.

4. Nigel, Ali and Sue were given ten calculations to do.

The following table shows their answers. For each calculation, only one of the three obtained the correct answer. By working out an estimate for each question, decide who was correct in each calculation.

	Question	Nigel's answer	Ali's answer	Sue's answer
(a)	1.02 × 2.9	12.928	2.958	6.438
(b)	0.99 × 46.7	46.233	32.136	25.633
(c)	4.8 × 10.4	26.32	49.92	89.42
(d)	33.264 ÷ 13.2	8.42	12.62	2.52
(e)	35.244 ÷ 8.01	4.4	1.4	12.4
(f)	7.1 × 7.1	50.41	5.41	36.01
(g)	27.028 ÷ 4.66	2.68	11.08	5.8
(h)	76.16 ÷ 47.6	1.6	8.6	12.2
(i)	12.7 × 8.5	50.85	107.95	204.75
(j)	8.342 ÷ 0.97	2.7	16.16	8.6

5. Without finding an exact answer:

(a) which of the following is nearest in value to $6.96 + 7.21 + 7.1 + 6.82$?

21.7, 28.09, 90.73 or 21.826

(b) which of the following is nearest in value to $3.14 \times 300 - 34.3$?

57, 87, 870 or 570

(c) which of the following is nearest in value to $9 \times \sqrt{7} + 10 \times \sqrt{14}$?

148, 67, 14.8 or 6.7

6. Estimate, correct to 1 significant figure, the value of 2.01×29.2.

7. Express each number correct to 1 significant figure and work out an *estimate* to

$$\frac{19.7 \times 9.75}{12.4}.$$

Use your calculator to evaluate $\dfrac{19.7 \times 9.75}{12.4}$ correct to 2 significant figures.

8. (a) Bottles of mineral water cost 39 p each. Estimate the cost of 142 bottles. Show how you obtained your estimate.

(b) *Without* using a calculator, work out the exact cost of 142 bottles of mineral water at 39 p each.

(MEG)

9. Charlie has to work out $5.2 \times 3.9 \times 2.1$. He uses a calculator and gets 425.88 for his answer.

Saeeda works out an approximate answer for the question. She knows that Charlie's answer must be wrong.

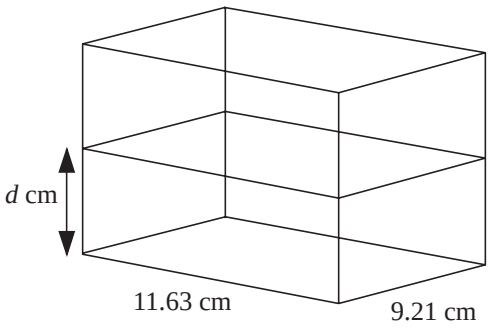
(a) (i) Write down approximate values for 5.2, 3.9 and 2.1.

(ii) Use these approximations to find a rough answer to Charlie's calculation.

(b) What is the mistake in Charlie's answer?

(SEG)

10. The rectangular glass tank shown in the diagram contains 1 litre (1000 cm^3 of water.



Not to scale

Sanjay wanted to find the depth (d cm) of the water.

He multiplied 11.63 by 9.21 on his calculator and wrote down the answer.

He then divided 1000 by this answer.

(a) Explain how you could use your calculator to find the depth without writing down the answer to 11.63×9.21.

(b) Work out the depth of the water, and write down all the figures on your calculator display.

(MEG)

11. Estimate the answer to the following.

$$\frac{83.4 + 39.72}{5.8 \times 10.1}$$

(OCR)

12. (a) Work out the value of 2^3.

(b) Work out $6 \times 15 + 4 \times 15$.

(c) Use approximations to estimate the value of $\dfrac{37.48 \times 6.13}{(1.95)^2}$

You **must** show your working.

(AQA)

6.6 Using Brackets and Memory on a Calculator

1. Use a calculator to evaluate each of the following:

(a) $480 - 96 + 15$ (b) $4059 \div 1353 \times 11$

(c) $533 + 118 - 227$ (d) $(251 + 696) \times 15$

(e) $(1283 - 694) \div (12 + 19)$ (f) $241 \times (270 - 121) \div (129 + 112)$

(g) $77175 \div [(17 + 18) \times (78 - 57)]$

(h) $[33350 \div (290 \times 115) + 798] \div (869 - 70)$

2. For each of the following expressions,

(a) evaluate, giving your answer correct to 2 decimal places;

(b) express each number correct to the nearest whole number and give an estimate to check your calculations.

(i) $4.6 + 3.9 \times 2.2$ (ii) $(4.6 + 3.9) \times 2.2$

(iii) $3.3 \times 25 \times 0.6125$ (iv) $4.2 \times 0.8 - 1.6 \times 1.2$

(v) $\dfrac{1.1 \times 12}{1.8^2 \times 3.1}$ (vi) $\left(\sqrt{9.4} + 3.6^2\right) \div 1.9$

3. (a) Use your calculator to work out the value of

$$\frac{6.08 \times (9.72)^2}{581 + 237}$$

Write down the *full* calculator display.

(b) (i) Write down a calculation that could be done mentally to check the answer to part (a) using numbers rounded to one significant figure.

(ii) Write down the answer to your calculation in part (b) (i).

(MEG)

4. Work out:

(a) 0.6×2.5 (b) $\dfrac{78 \times 14}{112 - 86}$ (c) $7^2 - 5^2$.

(MEG)

5. Gabriel buys a packet of 18 biscuits. The packet weighs 285 g.

(a) Gabriel wants to calculate the weight of one of these biscuits.
He presses the following buttons on his calculator.

[1] [8] [÷] [2] [8] [5] [=]

Explain what is wrong with his calculation.

(b) Calculate the weight of one of these biscuits. Give your answer to the nearest gram.

(c) Gabriel checks his answer without using a calculator.
Show how you can use approximation to check that his answer is of the right order. *You must show all your working.*

(SEG)

6. Use your calculator to work out:

$$\frac{95.4 + 18.9}{35.2 - 17.3}$$

(a) Write down your full calculator display.

(b) Give your answer to 2 significant figures.

(AQA)

7. Calculate the following.

(a) $\sqrt{57.76}$ (b) 4.2^4 (c) $\dfrac{3.9 - 0.65}{0.013}$

(d) $\dfrac{3.9^2 + 0.53}{3.9 \times 0.53}$ Give your answer to the nearest integer.

(OCR)

6.7 Upper and Lower Bounds

1. Write down the upper and lower bounds for each of the following measurements.

(a)	56 g	(b)	43.0 litres	(c)	2.35 metres
(d)	5.6 km	(e)	17.8 metres	(f)	8.54 kg
(g)	17.2 seconds	(h)	0.5 mm	(i)	1.9 cm

2. Find the upper and lower bounds for each of the calculations shown below, assuming the dimensions given are subject to rounding errors.

(a) The perimeter of a rectangle 65 cm by 84 cm.

(b) The area of a rectangle 65 cm by 84 cm.

(c) The perimeter of an octagon of side 42 mm.

(d) The volume of a cube of edge length 96 mm.

(e) The total weight of 54 objects, each weighing 2.62 kg.

3. (a) Angela measures the lengths of some sticks to the nearest centimetre. She arranges them in groups.

The length of the sticks in the shortest group is 14 cm, to the nearest centimetre.

(i) What is the smallest possible length for a stick in this group?

(ii) What is the smallest possible length for a stick which is **not** in this group?

(b) Angela measures the lengths of some other sticks. She records the length of one of these sticks as 52.2 cm, to the nearest tenth of a centimetre.

What is the smallest possible length of this stick?

4. Sections of a railway line are measured to the nearest metre as either 200 m or 80 m.

What are the bounds on the total length of 15 sections, consisting of eight 200 m sections and seven 80 m sections?

5. The area of a rectangle is 54.4 square centimetres, correct to 1 decimal place. The length of this rectangle is 8.3 centimetres, correct to 1 decimal place.

(a) From this information, write down

(i) the largest value (ii) the smallest value

that the length of the rectangle could have.

(b) Use your answers in (a) to calculate the largest possible width of the rectangle.

(NEAB)

6. The formula $S = \dfrac{F}{A}$ is used in engineering.

$F = 819$, correct to 3 significant figures

$A = 2.93$, correct to 3 significant figures.

(a) For the value of F, write down

(i) the upper bound (ii) the lower bound.

(b) For the value of A, write down

(i) the upper bound (ii) the lower bound.

(c) Calculate

(i) the upper bound (ii) the lower bound

for the value of S for these values of F and A. Write down *all* the figures on your calculator display.

(d) Write down this value of S correct to an appropriate number of significant figures.

(LON)

7. Cases each weigh 20 kg to the nearest kilogram. What is the least that six cases could weigh?

(AQA)

8. I wish to paint the outside walls of my house. A tin of paint covers $25\ \text{m}^2$, correct to the nearest $5\ \text{m}^2$. The outside walls of my house have an area of $320\ \text{m}^2$, correct to the nearest $10\ \text{m}^2$.

Calculate the maximum number of tins of paint that I may have to buy.

(OCR)

9. The time period T of a simple pendulum of length l is given by the formula

$$T = 2\pi\sqrt{\frac{l}{g}}$$

where g is the acceleration due to gravity.

The length of a simple pendulum is given as 30 cm, correct to 2 significant figures. The value of g is given as 9.8, correct to 2 significant figures.

Calculate the greatest value of T.

Give your answer correct to 3 significant figures.

(Edexcel)

10. A circle has an area of $100\ \text{cm}^2$, measured to the nearest square centimetre.

What is the lower bound of the radius?

(AQA)