

Exercises in KS4
Mathematics
Year 10 Basics
R Joinson

Sumbooks 5 Northway Chester CH4 8BB

Exercises in KS4 Mathematics - Year 10 Basics

First Published 2006

Copyright R Joinson and **Sumbooks**

This package of worksheets is sold subject to the condition that it is photocopied for educational purposes only on the premises of the purchaser

ISBN 0-9543580-7-4

Preface

Most of the questions are at either level 5 or level 6 of the National Curriculum. There may be some overlap of the levels where I have found it unavoidable in order to keep the questions sensible.

The answers to Missing Blocks, Drawing F s, and Enlarging Numbers, can be accommodated on the question sheets.

The work carries on from the Year 9 Basics worksheets.

R Joinson

May 2006
Chester

Contents

Whole Numbers	7
10 s, 100 s and 1000 s	8
More 10 s, 100 s and 1000 s	9
Rounding off	10
Negatives 1	11
Negatives 2	12
Multiplication 1	13
Multiplication 2	14
Multiplying Decimals 1	15
Multiplying Decimals 2	16
Division 1	17
Division 2	18
Division with Decimals 1	19
Division with Decimals 2	20
Cancelling Fractions	21
Mixed Fractions	22
Calculating a Fraction	23
Fraction Problems	24
Adding and Subtracting Fractions 1	25
Adding and Subtracting Fractions 2	26
Calculating Percentages 1	27
Calculating Percentages 2	28
Fractions, Decimals and Percentages	29
Ratio and Proportion 1	30
Ratio and Proportion 2	31
Checking	32
Adding Letters and Numbers	33
Simplifying Expressions 1	34
Simplifying Expressions 2	35
Substitution 1	36
Substitution 2	37
Brackets 1	38
Brackets 2	39
Multiplying a Bracket by a Bracket	40
Finding a Missing Expression	41
Equations 1	42
Equations 2	43
Equations 3	44
Number Rules	45
Number Grid	46
Number Patterns 1	47
Number Patterns 2	48
Negative Co-ordinates 1	49
Negative Co-ordinates 2	50
Negative Co-ordinates 3	51
Negative Co-ordinates 4	52
Trial and Improvement 1	53
Trial and Improvement 2	54

Angles	55
Triangles	56
Angles at a Point	57
Drawings	58
Angles of Quadrilaterals	59
Regular Polygons	60
Intersecting and Parallel Lines	61
Instructions 1	62
Instructions 2	63
Nets of Cubes	64
Nets of Cuboids	65
Nets of Triangular Prisms	66
Area and Perimeter 1	67
Area and Perimeter 2	68
Missing Blocks	69
Enlargements	70
Viewing Shapes	71
Drawing F s	72
Rotational Symmetry	73
Metric and Imperial Measure	74
Estimating Measure	75
Pie	76
Circumference of a Circle	77
Area of a Circle	78
Circumference and Area of a Circle	79
Areas of Rectangles	80
Volumes	81
Enlarging Numbers	82
Mean and Range 1	83
Mean and Range 2	84
Rainfall	85
Restaurant Customers	86
Computer Sales	87
Bicycle Prices	88
Heights of Students	89
Travelling	90
There and Back	91
Percentage Bars 1	92
Percentage Bars 2	93
Constructing a Pie Chart 1	94
Constructing a Pie Chart 2	95
Comparing Pie Charts	96
Scatter Diagrams	97
Probability 1	98
Probability 2	99
Probability 3	100
Results Grids 1	101
Results Grids 2	102
Results Grids 3	103
Combining Numbers	104

Whole Numbers

10b

1) Write in words the following numbers

- | | | | | |
|--------------|--------------|---------------|---------------|---------------|
| a) 293 | b) 536 | c) 834 | d) 1834 | e) 4500 |
| f) 11,450 | g) 17,402 | h) 27,964 | i) 43,745 | j) 82,000 |
| k) 100,000 | l) 172,000 | m) 400,050 | n) 565,000 | o) 876,935 |
| p) 911,460 | q) 1,100,00 | r) 1,237,664 | s) 2,584,747 | t) 3,384,000 |
| u) 6,200,000 | v) 7,672,000 | w) 11,400,000 | x) 23,761,000 | y) 54,736,946 |

2) Write down each of these in number form

- | | |
|--|---------------------------------------|
| a) Two hundred and seventy | b) Nine hundred and twenty four |
| c) One thousand and eighty seven | d) Six thousand, four hundred and six |
| e) Eight thousand, four hundred and three | |
| f) Nine thousand, six hundred and forty two | |
| g) Fifteen thousand, four hundred and eighty | |
| h) Twenty seven thousand, four hundred and ninety seven | |
| i) Twenty two thousand, four hundred | |
| j) Fifty four thousand, seven hundred and sixty one | |
| k) Seventy three thousand, five hundred and twenty seven | |
| l) One hundred and seven thousand | |
| m) One hundred and twenty eight thousand and six | |
| n) Three hundred and forty eight thousand, five hundred and sixty nine | |
| o) Six hundred and nine thousand | |
| p) Eight hundred thousand and fifty four | |
| q) Nine hundred thousand, one hundred and fifty four | |
| r) One million | |
| s) One million, six hundred thousand | |
| t) One million, seven hundred and sixteen thousand | |
| u) Five million and twenty seven | |
| v) Seven million, one hundred and forty thousand, three hundred and fifty four | |
| w) Nine million, four hundred thousand and sixty four | |
| x) Fifteen million | |
| y) Twenty one million, one hundred and fifteen thousand, six hundred and four | |
| z) Twenty seven million, three hundred and fifteen thousand | |

10's, 100's and 1000's

Do not use a Calculator

10b

1) Multiply each of these by 10

- | | | | | | |
|----------|----------|-----------|-----------|-----------|------------|
| a) 5 | b) 23 | c) 42 | d) 86 | e) 1241 | f) 534 |
| g) 6.3 | h) 2.6 | i) 0.4 | j) 52.5 | k) 0.14 | l) 2.043 |
| m) 0.106 | n) 0.036 | o) 0.0053 | p) 0.1005 | q) 0.0012 | r) 0.00431 |

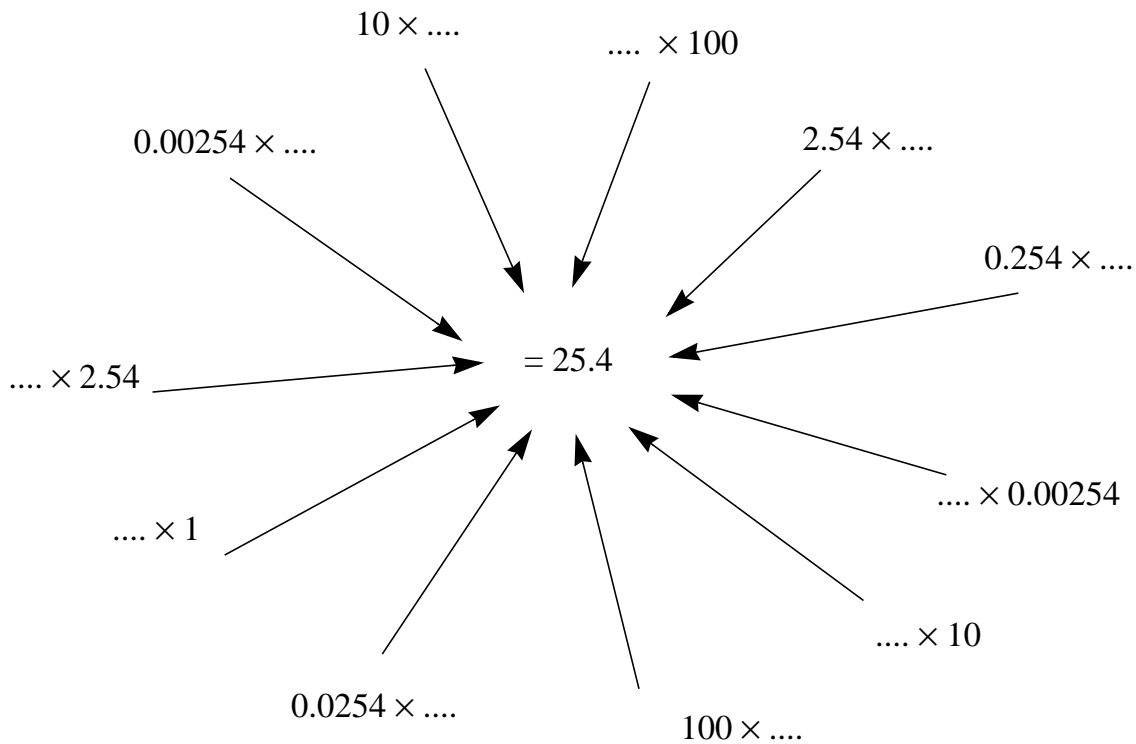
2) Multiply each of these by 100

- | | | | | | |
|----------|---------|----------|---------|-----------|------------|
| a) 2 | b) 15 | c) 43 | d) 165 | e) 472 | f) 642 |
| g) 3.576 | h) 4.06 | i) 7.034 | j) 16.9 | k) 27.6 | l) 84.3 |
| m) 0.6 | n) 0.74 | o) 0.362 | p) 0.96 | q) 0.0432 | r) 0.00641 |

3) Multiply each of these by 1000

- | | | | | | |
|--------|---------|----------|----------|----------|-----------|
| a) 4 | b) 38 | c) 53 | d) 174 | e) 300 | f) 591 |
| g) 3.5 | h) 19.6 | i) 45.7 | j) 126.4 | k) 507.3 | l) 8.034 |
| m) 0.5 | n) 0.17 | o) 0.053 | p) 0.503 | q) 0.065 | r) 0.0005 |

4) Each of these gives an answer of 25.4. Fill in the missing values.



More 10's, 100's and 1000's

Do not use a Calculator

10b

1) Divide each of these by 10

- | | | | | | |
|---------|----------|----------|----------|----------|-----------|
| a) 7 | b) 21 | c) 409 | d) 83.1 | e) 1604 | f) 50,784 |
| g) 4.51 | h) 7.8 | i) 17.56 | j) 74.3 | k) 1687 | l) 804.5 |
| m) 0.63 | n) 0.563 | o) 0.734 | p) 0.054 | q) 0.036 | r) 0.4 |

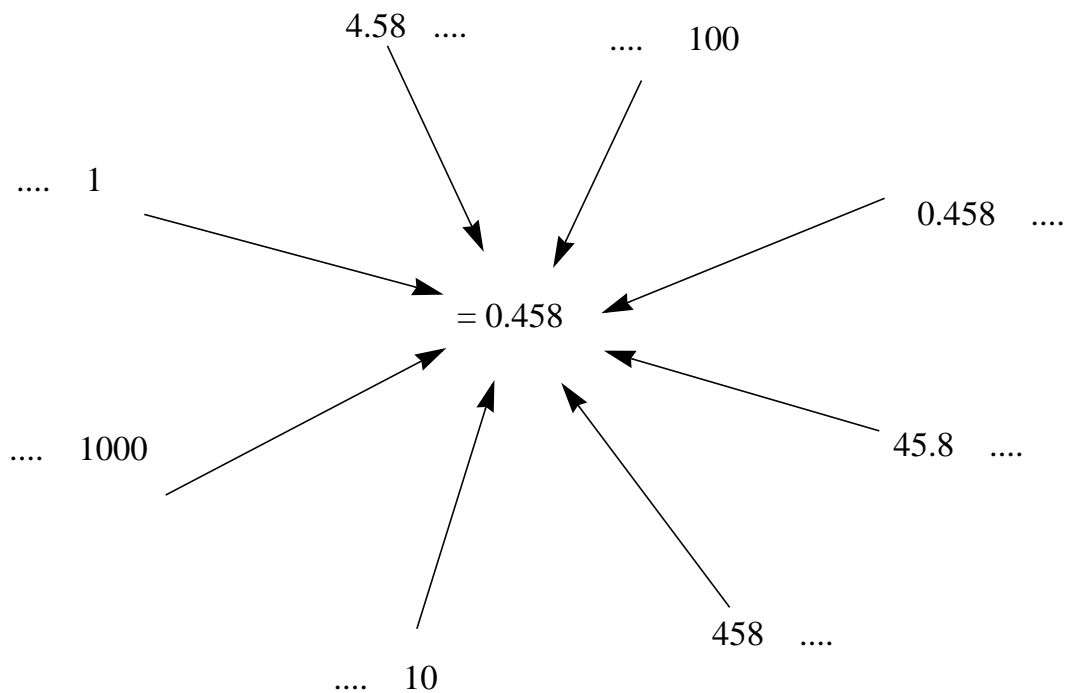
2) Divide each of these by 100

- | | | | | | |
|----------|----------|---------|----------|----------|-----------|
| a) 6 | b) 32 | c) 840 | d) 1740 | e) 7409 | f) 50,000 |
| g) 3.654 | h) 6.42 | i) 8.94 | j) 16.5 | k) 27.4 | l) 341 |
| m) 0.36 | n) 0.532 | o) 0.74 | p) 0.042 | q) 0.003 | r) 0.021 |

3) Divide each of these by 1000

- | | | | | | |
|---------|-----------|---------|----------|----------|----------|
| a) 9 | b) 37 | c) 60 | d) 184 | e) 853 | f) 1300 |
| g) 8.53 | h) 19.673 | i) 24.5 | j) 129 | k) 462.5 | l) 7104 |
| m) 0.6 | n) 0.643 | o) 0.43 | p) 0.604 | q) 0.053 | r) 0.101 |

4) Each of these gives an answer of 0.458. Fill in the missing values.



Rounding off

Do not use a calculator

10b

1) A cinema keeps records of the number of tickets it sells.

The table shows the number of tickets it sells in one week.

a) Round off the numbers to the nearest ten and complete the third column.

b) Round off the numbers to the nearest 100 and fill in the fourth column.

Day of the Week	Number of Tickets Sold	Number to the Nearest 10	Number to the Nearest 100
Sunday	2,153	2,150	
Monday	1,212		
Tuesday	1,056		
Wednesday	1,322		
Thursday	1,864		
Friday	2,021		
Saturday	2,643		

c) On another day the cinema sells 1750 tickets, to the nearest 10.

How many tickets could have been sold?

d) On another day 1900 tickets were sold, correct to the nearest 100, or 1850 correct to the nearest 10.

How many tickets could have been sold?

e) From the table above;

i) Calculate the total number of tickets sold in the week.

Each ticket costs £6.25.

ii) Calculate the approximate value of all the tickets sold.

2) Tickets for the cinema cost £7.45 each. Round this off to the nearest pound.

A group of 28 people go to the cinema. Round this off to the nearest 10.

Use these estimates to calculate an approximation of the total cost.

3) A total of 1234 tickets were sold during one day.

Each ticket cost £6.85.

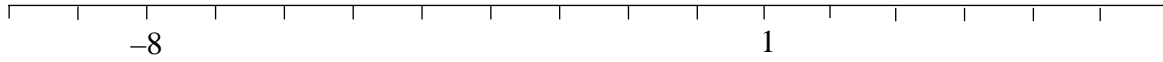
Do an estimate and calculate the approximate cost of the tickets.

Negatives 1

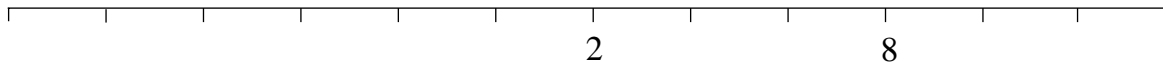
10b

1) Copy the number lines below and put in the missing numbers.

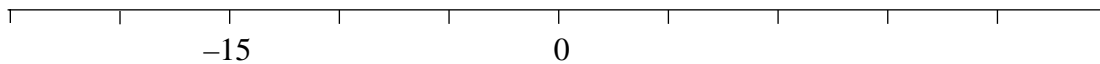
a)



b)



c)



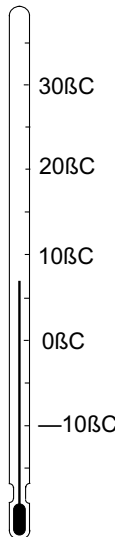
2) Write down these temperatures in order of size, lowest first.

a) -15°C 8°C 2°C -9°C -5°C 7°C 4°C 2.4°C

b) -2.5°C 0.4°C -2.2°C -1.3°C -2.7°C 3.3°C 5.2°C 1.3°C

c) 6°C $1\frac{1}{4}^{\circ}\text{C}$ -4°C $-7\frac{3}{4}^{\circ}\text{C}$ -8°C $2\frac{1}{2}^{\circ}\text{C}$ $-5\frac{1}{4}^{\circ}\text{C}$ 3°C

3)



The diagram shows a thermometer.

a) What is the greatest temperature it will measure?

b) What is the lowest temperature it will measure?

c) What temperature is the thermometer showing?

d) The temperature rises by 4°C .

What will the new temperature be?

e) The temperature drops by a further 15°C

What will the new temperature be?

f) The temperature rises by a further 2°C .

What will the final temperature be?

g) By how much has the temperature dropped from that shown in the diagram?

4) The temperature inside a freezer is -19°C .

The temperature inside a refrigerator is 4°C .

a) What is the difference in temperature between them?

b) A bag of peas is taken out of the freezer and allowed to thaw.

The next day its temperature has risen by 32°C .

What is its new temperature?

Negatives 2

10b

1) The temperature of a bag of chips in a freezer is -21°C .

After being deep fried their temperature is 145°C .

By how much has their temperature risen?

2) Lucy's mum buys some fresh gooseberries.

The temperature of the gooseberries is 15°C in the kitchen.

She freezes them and their temperature falls to -18°C .

What is the fall in temperature?

3) Two numbers multiplied together make -30 .

If one of the numbers is 10 what is the other?

4) Two numbers multiplied together make -18 .

If one of the numbers is 6 what is the other?

5) Two numbers multiplied together make -40 .

If one of the numbers is -10 , what is the other?

6) Write down the answer to these

a) 8×8

b) 8×-8

c) -8×8

d) -8×-8

7) Write down both square roots of these numbers

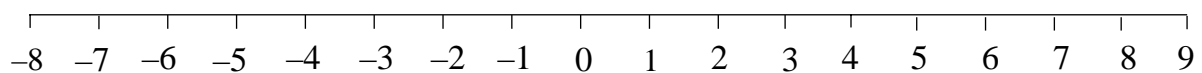
a) 9

b) 16

c) 25

d) 36

8) Use the number line below to help you do these sums.



a) $6 - 5 =$

b) $5 - 6 =$

c) $7 - 7 =$

d) $-7 + 9 =$

e) $4 - 10 =$

f) $-2 - 6 =$

g) $-2 + 6 =$

h) $-3 + 5 =$

i) $0 + 6 =$

j) $6 - 6 =$

k) $0 + 6 =$

l) $-6 + 6 =$

m) $-3 + 4 =$

n) $-1 + 5 =$

o) $-3 + 7 =$

p) $-8 + 10 =$

Multiplication 1

Do not use a calculator

10b

1) Multiply each of these.

$$\begin{array}{r} \text{a)} \\ 24 \\ \times 5 \\ \hline \end{array}$$

$$\begin{array}{r} \text{b)} \\ 32 \\ \times 6 \\ \hline \end{array}$$

$$\begin{array}{r} \text{c)} \\ 43 \\ \times 4 \\ \hline \end{array}$$

$$\begin{array}{r} \text{d)} \\ 57 \\ \times 7 \\ \hline \end{array}$$

$$\begin{array}{r} \text{e)} \\ 63 \\ \times 9 \\ \hline \end{array}$$

$$\begin{array}{r} \text{f)} \\ 74 \\ \times 8 \\ \hline \end{array}$$

$$\begin{array}{r} \text{g)} \\ 31 \\ \times 11 \\ \hline \end{array}$$

$$\begin{array}{r} \text{h)} \\ 54 \\ \times 15 \\ \hline \end{array}$$

$$\begin{array}{r} \text{i)} \\ 38 \\ \times 14 \\ \hline \end{array}$$

$$\begin{array}{r} \text{j)} \\ 42 \\ \times 23 \\ \hline \end{array}$$

$$\begin{array}{r} \text{k)} \\ 24 \\ \times 25 \\ \hline \end{array}$$

$$\begin{array}{r} \text{l)} \\ 36 \\ \times 18 \\ \hline \end{array}$$

$$\begin{array}{r} \text{m)} \\ 51 \\ \times 32 \\ \hline \end{array}$$

$$\begin{array}{r} \text{n)} \\ 55 \\ \times 47 \\ \hline \end{array}$$

$$\begin{array}{r} \text{o)} \\ 62 \\ \times 50 \\ \hline \end{array}$$

$$\begin{array}{r} \text{p)} \\ 173 \\ \times 5 \\ \hline \end{array}$$

$$\begin{array}{r} \text{q)} \\ 184 \\ \times 7 \\ \hline \end{array}$$

$$\begin{array}{r} \text{r)} \\ 293 \\ \times 6 \\ \hline \end{array}$$

$$\begin{array}{r} \text{s)} \\ 432 \\ \times 4 \\ \hline \end{array}$$

$$\begin{array}{r} \text{t)} \\ 644 \\ \times 8 \\ \hline \end{array}$$

$$\begin{array}{r} \text{u)} \\ 143 \\ \times 13 \\ \hline \end{array}$$

$$\begin{array}{r} \text{v)} \\ 225 \\ \times 17 \\ \hline \end{array}$$

$$\begin{array}{r} \text{w)} \\ 365 \\ \times 26 \\ \hline \end{array}$$

$$\begin{array}{r} \text{x)} \\ 547 \\ \times 37 \\ \hline \end{array}$$

$$\begin{array}{r} \text{y)} \\ 641 \\ \times 76 \\ \hline \end{array}$$

2) Multiply each of these

$$\text{a)} 19 \times 22$$

$$\text{b)} 18 \times 36$$

$$\text{c)} 24 \times 29$$

$$\text{d)} 37 \times 38$$

$$\text{e)} 46 \times 32$$

$$\text{f)} 64 \times 26$$

$$\text{g)} 77 \times 35$$

$$\text{h)} 84 \times 52$$

$$\text{i)} 91 \times 42$$

$$\text{j)} 75 \times 63$$

$$\text{k)} 143 \times 5$$

$$\text{l)} 253 \times 7$$

$$\text{m)} 641 \times 9$$

$$\text{n)} 425 \times 4$$

$$\text{o)} 580 \times 9$$

$$\text{p)} 241 \times 13$$

$$\text{q)} 343 \times 23$$

$$\text{r)} 447 \times 30$$

$$\text{s)} 438 \times 41$$

$$\text{t)} 514 \times 52$$

$$\text{u)} 557 \times 61$$

$$\text{v)} 318 \times 70$$

$$\text{w)} 649 \times 52$$

$$\text{x)} 759 \times 46$$

$$\text{y)} 573 \times 82$$

Multiplication 2

Do not use a calculator

10b

- 1) The distance around a race track is 400 metres. Oliver completes 3 laps. How far has he run?
- 2) A box contains 54 new pencils. The mathematics department buys 13 boxes. How many pencils do they get?
- 3) A box contains 12 bottles of wine. A wine merchant has 16 boxes delivered to his shop. How many bottles are there altogether?
- 4) The number of sweets in a packet is 27. Emma buys 9 packets. How many sweets does she buy?
- 5) Shannon wants to estimate the height of her house. She measures the height of one brick and a layer of mortar to be 16 centimetres. She counts the number of bricks in the height of its wall to be 34. How high is the wall?
- 6) Mr. Davies is a long distance lorry driver. Each week he travels to France and back, a distance of 453 kilometres. How far does he travel in 46 weeks?
- 7) Holly's car travels 13 kilometres using one litre of petrol. How far will it travel if it uses 47 litres?
- 8) In Mr. Patel's class there are 27 pupils. They all go on a school holiday. The cost of the holiday is £136 for each pupil. How much in total does Mr. Patel collect from the pupils?
- 9) Liam's baby cousin plays with cubical blocks. Liam measures each block to be 5.3cms. He builds a tower of blocks by placing them on top of each other. How tall is the tower if he uses 19 blocks?
- 10) The square slabs in George's garden path are 63 centimetres. He counts 27 slabs in the length of the path.
 - a) How long is the path in centimetres?
 - b) How long is the path in metres and centimetres?

Multiplying Decimals 1

Do not use a calculator

10b

1) Multiply each of these

$$\begin{array}{r} \text{a)} \\ 4.1 \\ \times 5 \\ \hline \end{array}$$

$$\begin{array}{r} \text{b)} \\ 5.2 \\ \times 4 \\ \hline \end{array}$$

$$\begin{array}{r} \text{c)} \\ 1.7 \\ \times 8 \\ \hline \end{array}$$

$$\begin{array}{r} \text{d)} \\ 6.9 \\ \times 6 \\ \hline \end{array}$$

$$\begin{array}{r} \text{e)} \\ 8.3 \\ \times 7 \\ \hline \end{array}$$

$$\begin{array}{r} \text{f)} \\ 3.2 \\ \times 9 \\ \hline \end{array}$$

$$\begin{array}{r} \text{g)} \\ 9.1 \\ \times 12 \\ \hline \end{array}$$

$$\begin{array}{r} \text{h)} \\ 6.3 \\ \times 18 \\ \hline \end{array}$$

$$\begin{array}{r} \text{i)} \\ 4.7 \\ \times 23 \\ \hline \end{array}$$

$$\begin{array}{r} \text{j)} \\ 7.3 \\ \times 37 \\ \hline \end{array}$$

$$\begin{array}{r} \text{k)} \\ 8.3 \\ \times 4.2 \\ \hline \end{array}$$

$$\begin{array}{r} \text{l)} \\ 4.1 \\ \times 1.7 \\ \hline \end{array}$$

$$\begin{array}{r} \text{m)} \\ 3.8 \\ \times 2.4 \\ \hline \end{array}$$

$$\begin{array}{r} \text{n)} \\ 5.7 \\ \times 3.7 \\ \hline \end{array}$$

$$\begin{array}{r} \text{o)} \\ 9.4 \\ \times 5.6 \\ \hline \end{array}$$

$$\begin{array}{r} \text{p)} \\ 3.72 \\ \times 6 \\ \hline \end{array}$$

$$\begin{array}{r} \text{q)} \\ 5.83 \\ \times 4 \\ \hline \end{array}$$

$$\begin{array}{r} \text{r)} \\ 9.41 \\ \times 9 \\ \hline \end{array}$$

$$\begin{array}{r} \text{s)} \\ 1.56 \\ \times 7 \\ \hline \end{array}$$

$$\begin{array}{r} \text{t)} \\ 3.08 \\ \times 6 \\ \hline \end{array}$$

$$\begin{array}{r} \text{u)} \\ 4.22 \\ \times 1.5 \\ \hline \end{array}$$

$$\begin{array}{r} \text{v)} \\ 5.82 \\ \times 2.4 \\ \hline \end{array}$$

$$\begin{array}{r} \text{w)} \\ 9.63 \\ \times 4.7 \\ \hline \end{array}$$

$$\begin{array}{r} \text{x)} \\ 8.45 \\ \times 8.3 \\ \hline \end{array}$$

$$\begin{array}{r} \text{y)} \\ 7.19 \\ \times 4.9 \\ \hline \end{array}$$

2) Multiply each of these

$$\text{a)} 1.3 \times 0.4$$

$$\text{b)} 2.8 \times 0.7$$

$$\text{c)} 5.8 \times 0.9$$

$$\text{d)} 4.8 \times 0.5$$

$$\text{e)} 6.3 \times 0.8$$

$$\text{f)} 2.1 \times 1.4$$

$$\text{g)} 3.7 \times 2.5$$

$$\text{h)} 5.8 \times 2.7$$

$$\text{i)} 6.3 \times 4.7$$

$$\text{j)} 8.9 \times 2.7$$

$$\text{k)} 2.53 \times 7$$

$$\text{l)} 3.84 \times 5$$

$$\text{m)} 7.39 \times 8$$

$$\text{n)} 8.29 \times 4$$

$$\text{o)} 9.15 \times 7$$

$$\text{p)} 17.1 \times 0.8$$

$$\text{q)} 24.3 \times 0.4$$

$$\text{r)} 53.7 \times 0.3$$

$$\text{s)} 93.1 \times 0.7$$

$$\text{t)} 67.9 \times 0.5$$

$$\text{u)} 37.4 \times 1.8$$

$$\text{v)} 53.6 \times 6.1$$

$$\text{w)} 73.5 \times 8.1$$

$$\text{x)} 47.8 \times 3.9$$

$$\text{y)} 43.7 \times 7.7$$

Multiplying Decimals 2

Do not use a calculator

10b

- 1) The cost of a radio is £23.37. What is the cost of three radios?
- 2) A box has a depth of 24.5cm. Michael places twelve of these boxes on top of each other to make a tower. What is the height of the tower?
- 3) The cost to go into the zoo is £12.45 per person. What is the cost for a group of 5 people?
- 4) A piece of string is cut into 6 equal pieces. Each piece measures 18.7cm. What was the length of the string?
- 5) Eleanor buys 60 bulbs for her garden. The bulbs are sold in packs of 5.
 - a) How many packs does she buy?
 - b) One pack costs £1.37. What is the cost of all 60 bulbs?
- 6) Kieran's motorbike travels 27.4 kilometres using one litre of petrol. How far will it travel if it uses 23 litres?
- 7) The price of a theatre ticket is £10.45 for an adult and £6.85 for a child.
A group of two adults and three children go to the pantomime.
 - a) What is the cost of the adults' tickets?
 - b) What is the cost of the children's tickets?
 - c) What is the total cost of the tickets?
- 8) Danielle measures the height of one step on her stairs to be 22.6cm. There are 13 steps up to her bedroom. How high is this?
- 9) The square slabs in Joseph's garden path are 55.6 centimetres. He counts 19 slabs in the length of the path.
 - a) How long is the path in centimetres?
 - b) How long is the path in metres and centimetres?
- 10) A book weighs 1.43kg. The printer packs them into boxes of 16 books. An empty box weighs 0.87kg.
 - a) What is the weight of 16 books?
 - b) What is the weight of the box when the books have been packed?

Division 1

Do not use a calculator

10b

1) Divide each of the following. There are no remainders.

a) $55 \div 5$

b) $78 \div 2$

c) $108 \div 4$

d) $84 \div 4$

e) $175 \div 5$

f) $133 \div 7$

g) $282 \div 3$

h) $312 \div 6$

i) $441 \div 7$

j) $648 \div 4$

k) $848 \div 8$

l) $846 \div 9$

m) $636 \div 4$

n) $680 \div 8$

o) $868 \div 7$

p) $552 \div 6$

2) Divide each of the following. There are no remainders.

a) $231 \div 11$

b) $180 \div 15$

c) $336 \div 21$

d) $476 \div 34$

e) $567 \div 27$

f) $561 \div 33$

g) $594 \div 18$

h) $675 \div 27$

i) $980 \div 35$

j) $943 \div 41$

k) $832 \div 52$

l) $840 \div 60$

m) $795 \div 15$

n) $476 \div 28$

o) $900 \div 36$

p) $812 \div 29$

3) Divide each of the following. In each case there will be a remainder.

a) $47 \div 5$

b) $81 \div 2$

c) $97 \div 4$

d) $123 \div 6$

e) $417 \div 8$

f) $357 \div 4$

g) $289 \div 5$

h) $442 \div 7$

i) $532 \div 9$

j) $659 \div 4$

k) $452 \div 6$

l) $597 \div 7$

m) $714 \div 9$

n) $382 \div 3$

o) $995 \div 8$

p) $486 \div 4$

4) Divide each of the following. Some will have remainders.

a) $107 \div 11$

b) $170 \div 15$

c) $206 \div 13$

d) $294 \div 21$

e) $334 \div 22$

f) $450 \div 25$

g) $744 \div 31$

h) $556 \div 35$

i) $648 \div 36$

j) $509 \div 42$

k) $704 \div 44$

l) $914 \div 47$

m) $778 \div 51$

n) $848 \div 53$

o) $576 \div 62$

p) $923 \div 71$

Division 2

Do not use a calculator

10b

- 1) A piece of string measuring 150 centimetres is cut into 5 equal pieces. How long will each piece be?
- 2) A piece of string measuring 144cm is cut into pieces each measuring 18cm. How many pieces is it cut into?
- 3) Olivia's grandad has 7 grandchildren. At Christmas he gives them all the same amount of money. He shares £105 between them. How much do they each get?
- 4) The school hall has 364 seats in it. They are arranged into rows of 13. How many rows are there?
- 5) A ream of paper contains 500 sheets. The teacher divides it equally amongst the class. She keeps the sheets left over.
 - a) There are 22 pupils in the class. How many sheets do they each get?
 - b) How many sheets does the teacher have?
- 6) Twenty five perfume bottles are packed into a box. The total weight of the box and bottles is 2 kilograms. If the box weighs 200 grammes:
 - a) What is the weight, in grammes, of all the bottles?
 - b) What is the weight of each bottle?
- 7) A wine bottle holds 750ml. It is poured into glasses each holding 125ml. How many glasses will the bottle fill?
- 8) Samuel can save £32 per week from his wages. How many weeks will he have to save in order to buy a computer costing £500?
- 9) A book shelf will hold 40 books. Each book is 15mm thick. How many books will it hold if they are 18mm thick?
- 10) A sheet of A4 paper measures 210mm by 296mm. John wants to cut it up into squares measuring 20mm.
 - a) How many squares can he draw along the longest side?
 - b) How many squares can he draw along the shortest side?
 - c) What is the most number of squares he can cut from the sheet?

Division with Decimals 1

Do not use a calculator

10b

1) Divide each of the following. In each case the answers have 1 decimal place.

- | | | | |
|-------------------|-------------------|-------------------|------------------|
| a) $6.3 \div 3$ | b) $8.0 \div 5$ | c) $16.8 \div 4$ | d) $28.8 \div 6$ |
| e) $25.2 \div 7$ | f) $37.2 \div 3$ | g) $48.5 \div 5$ | h) $56.4 \div 6$ |
| i) $37.4 \div 2$ | j) $81 \div 5$ | k) $77.4 \div 9$ | l) $46.8 \div 3$ |
| m) $147.6 \div 6$ | n) $202.5 \div 9$ | o) $101.6 \div 4$ | p) $5.6 \div 8$ |
| q) $106.2 \div 3$ | r) $282.6 \div 9$ | s) $164.4 \div 6$ | t) $356 \div 8$ |

2) Divide each of the following. In each case the answers have two decimal places.

- | | | | |
|--------------------|--------------------|--------------------|-------------------|
| a) $87.71 \div 7$ | b) $43.95 \div 3$ | c) $76 \div 8$ | d) $147 \div 4$ |
| e) $45.3 \div 6$ | f) $67.2 \div 5$ | g) $109.62 \div 2$ | h) $154 \div 8$ |
| i) $182.2 \div 5$ | j) $227.64 \div 4$ | k) $1.08 \div 9$ | l) $76.74 \div 3$ |
| m) $144.84 \div 4$ | n) $141.24 \div 6$ | o) $1.75 \div 7$ | p) $0.36 \div 4$ |
| q) $28.89 \div 9$ | r) $1.44 \div 3$ | s) $0.18 \div 6$ | t) $13.86 \div 7$ |

3) Twenty five perfume bottles are packed into a box. The total weight of the box and bottles is 3.2 kilograms. If the box weighs 200 grammes:

- What is the weight, in kilograms, of all the bottles?
- What is the weight, in kilograms, of each bottle?

4) A bottle of water holds 2 litres. A glass can be filled 8 times from it. What is the capacity of the glass?

5) A length of string measuring 259 centimetres is cut into 14 equal pieces. How long is each piece?

6) The cost of 12 bottles of fizzy water was £7.68. What was the cost of each bottle?

7) A train is made up of 9 carriages, all of the same length. The total length of the train is 292.86 metres. What is the length of each carriage?

Division with Decimals 2

Do not use a calculator

10b

- 1) The perimeter of a square tile is 38.5cm. What is the length of one of its sides?
- 2) £10.92 is shared equally between 7 people. How much do they each receive?
- 3) A large box weighs 1.3kg. It is filled with 12 smaller boxes, each containing a radio. Each of these smaller boxes has the same weight. If the total weight of the full box is 15.1kg, what is the weight of each of the smaller boxes?
- 4) Amy buys a school bus pass to last her for a month. During January she goes to school 16 times. If the pass costs £18.56 how much did it cost her per day?
- 5) Cameron has a stall at a market. He buys 15 radios for £143.25. He sells them on his stall for £14.99 each.
 - a) How much did each radio cost him?
 - b) How much profit did he make on each radio?
- 6) The top of a square garden table is made from 16 square tiles. The area of the table is 1764 square centimetres.
 - a) What is the area of one tile?
 - b) What is the length of a side of one of the tiles?
- 7) A 2.5 litre bottle of water is divided equally between 9 glasses. There is 0.16 litres left in the bottle.
 - a) How many litres of water are divided into the glasses?
 - b) How much water is in each glass? (give your answer in both litres and millilitres)
- 8) The jackpot for a local lottery stands at £754.04. It is shared equally between 14 winners. How much do they each get?
- 9) At a factory, lengths of metal tubing are cut to size. A length of 6.3 metres is cut into 18 equal pieces. How long is each piece?
- 10) Divide £401.12 equally between 23 people.

Cancelling Fractions

10b

1) Change these into their lowest terms

a) $\frac{4}{8}$

b) $\frac{8}{12}$

c) $\frac{3}{6}$

d) $\frac{3}{9}$

e) $\frac{4}{6}$

f) $\frac{5}{10}$

g) $\frac{6}{9}$

h) $\frac{6}{12}$

i) $\frac{7}{14}$

j) $\frac{2}{14}$

k) $\frac{2}{12}$

l) $\frac{4}{12}$

m) $\frac{4}{14}$

n) $\frac{10}{12}$

o) $\frac{6}{10}$

p) $\frac{2}{20}$

q) $\frac{14}{18}$

r) $\frac{15}{20}$

s) $\frac{12}{16}$

t) $\frac{12}{18}$

u) $\frac{14}{20}$

v) $\frac{8}{24}$

w) $\frac{14}{32}$

x) $\frac{14}{30}$

y) $\frac{15}{36}$

2) Cancel down each of these fractions and say which have a value of $\frac{1}{5}$

$\frac{4}{24}$

$\frac{6}{33}$

$\frac{4}{20}$

$\frac{3}{16}$

$\frac{5}{30}$

$\frac{3}{15}$

$\frac{2}{10}$

$\frac{7}{42}$

$\frac{9}{36}$

$\frac{8}{44}$

$\frac{5}{25}$

$\frac{7}{56}$

3) List these fractions in order of size, smallest first.

$\frac{1}{2}$

$\frac{24}{30}$

$\frac{7}{10}$

$\frac{1}{4}$

$\frac{45}{50}$

$\frac{1}{30}$

$\frac{7}{20}$

$\frac{1}{5}$

In each of these questions, give the answer as a fraction in its lowest terms.

4) Sarah has £200. She gives her sister £60. What fraction of her money has Sarah given to her sister?

5) An oil tank has a capacity of 280,000 litres. 90,000 litres are taken from it. What fraction of the oil remains?

6) An aeroplane flies 9,000 kilometres. After 6,500 kilometres it lands for refuelling. What fraction of the journey is left?

7) A grocer buys 240kg of potatoes to sell on his market stall. He sells 200kg of them. What fraction of them does he not sell?

Mixed Fractions

10b

- 1) How many quarters are there in $2\frac{1}{2}$?
- 2) In each of these pairs of fractions, say which is the bigger. Show your workings out.

a) $\frac{3}{10}$ and $\frac{1}{5}$	b) $\frac{2}{5}$ and $\frac{7}{20}$
c) $\frac{9}{20}$ and $\frac{4}{10}$	d) $\frac{3}{4}$ and $\frac{2}{3}$
e) $\frac{5}{8}$ and $\frac{11}{16}$	f) $\frac{8}{15}$ and $\frac{11}{20}$
g) $\frac{5}{12}$ and $\frac{7}{18}$	h) $\frac{8}{25}$ and $\frac{15}{50}$
i) $\frac{7}{30}$ and $\frac{1}{5}$	j) $\frac{5}{9}$ and $\frac{4}{7}$
- 3) There are 400 people in an audience at a theatre. 250 are male, the remainder female. What fraction of the audience are female?
- 4) How many $\frac{1}{30}$ th are there in $\frac{1}{6}$ th?
- 5) How many $\frac{1}{20}$ th are there in $\frac{3}{5}$ th?
- 6) Concrete is made by mixing together 1 shovel full of cement with 3 shovels full of sand and 5 shovels full of stones. What fraction of the mixture is sand?
- 7) Adam can jump a height of 1 metre 50 centimetres. If he increases that to 1 metre 55centimetres, what is his fractional increase?
- 8) 100ml of orange squash is mixed with 500ml of water. What fraction of the mixture is squash?
- 9) Jessica travels to her gran's in London. The distance to London from her house is 260 kilometres. After 160km she stops for a rest. What fraction of the journey has she left?
- 10) A coach contains 85 passengers. 45 get off at a stop. What fraction of the passengers remain on the coach?

Calculating a Fraction

10b

1) Work these out, without using a calculator

- | | | | |
|-------------------------|-------------------------|-------------------------|-------------------------|
| a) $\frac{1}{4}$ of 36 | b) $\frac{3}{4}$ of 40 | c) $\frac{1}{5}$ of 20 | d) $\frac{2}{5}$ of 40 |
| e) $\frac{3}{5}$ of 30 | f) $\frac{3}{8}$ of 40 | g) $\frac{5}{8}$ of 64 | h) $\frac{3}{10}$ of 50 |
| i) $\frac{7}{10}$ of 70 | j) $\frac{3}{20}$ of 40 | k) $\frac{7}{10}$ of 50 | l) $\frac{3}{7}$ of 28 |
| m) $\frac{5}{8}$ of 80 | n) $\frac{3}{12}$ of 72 | o) $\frac{5}{12}$ of 96 | p) $\frac{5}{16}$ of 64 |

2) Work these out, without using a calculator

- | | | |
|-------------------------------|------------------------------|-----------------------------------|
| a) $\frac{5}{8}$ of 16 metres | b) $\frac{3}{10}$ of 50kg | c) $\frac{2}{5}$ of 30 kilometres |
| d) $\frac{4}{5}$ of £40 | e) $\frac{9}{10}$ of 40 days | f) $\frac{3}{8}$ of 56 litres |
| g) $\frac{7}{8}$ of 24km | h) $\frac{5}{12}$ of 108kg | i) $\frac{5}{7}$ of £140 |
| j) $\frac{3}{5}$ of £24 | k) $\frac{3}{10}$ of £37.50 | l) $\frac{2}{5}$ of £106 |

3) Use a calculator to do these

- | | | |
|-------------------------------|-----------------------------|-------------------------------|
| a) $\frac{2}{5}$ of £86 | b) $\frac{7}{10}$ of £13.40 | c) $\frac{4}{5}$ of £5.55 |
| d) $\frac{5}{8}$ of 20 metres | e) $\frac{7}{10}$ of 55kg | f) $\frac{3}{5}$ of 108km |
| g) $\frac{3}{8}$ of 25km | h) $\frac{7}{12}$ of 90kg | i) $\frac{3}{7}$ of £87.50 |
| j) $\frac{2}{5}$ of £45.50 | k) $\frac{3}{10}$ of £17 | l) $\frac{5}{8}$ of 44 litres |

Fraction Problems

10b

- 1) In a school $\frac{2}{5}$ of the pupils are girls.
 - a) What fraction are boys?
 - b) If there are 950 pupils at the school, how many are boys?
 - c) How many are girls?

- 2) Daniel earns £276 per week. He pays $\frac{1}{12}$ of it as tax. The remainder he keeps.
How much does he keep?

- 3) A computer costs £950. In a sale it is reduced in price by $\frac{1}{5}$. What is its new price?

- 4) A gardener sows 150 seeds. $\frac{7}{10}$ of them germinate and the rest die.
 - a) What fraction of them die?
 - b) How many seeds germinate?

- 5) In a town it is estimated that $\frac{3}{8}$ of the population are under the age of 20. The total population is 94,000.
 - a) What fraction of the population are 20 or over?
 - b) How many people are below the age of 20?

- 6) Luke mixes two paints together to get orange. $\frac{5}{8}$ of the mixture is red and the remainder is yellow.
 - a) What fraction of the mixture is yellow?
 - b) If he makes 4.8 litres of orange how much of each of the two colours must he mix together?

- 7) An alloy is made by combining together the metals copper and tin. $\frac{7}{12}$ of the alloy is copper and the remainder is tin.
 - a) What fraction of the alloy is tin?
 - b) How much copper is in 30g of the alloy?

- 8) $\frac{7}{40}$ of the cost of a television set is added on as tax. Robert pays £250 for a TV before the tax is added on. How much tax will he pay?

Adding and Subtracting Fractions 1

Do not use a calculator

10b

1) Add and subtract these fractions.

a) $\frac{1}{2} + \frac{1}{2}$

b) $\frac{1}{4} + \frac{3}{4}$

c) $\frac{1}{4} - \frac{1}{4}$

d) $2 + \frac{1}{2}$

e) $2 + 1\frac{3}{4}$

f) $3\frac{1}{2} - \frac{1}{4}$

g) $2\frac{3}{4} - \frac{1}{4}$

h) $\frac{3}{4} + \frac{1}{2}$

i) $2\frac{3}{4} - \frac{1}{2}$

j) $3\frac{1}{2} - 1\frac{1}{4}$

k) $5\frac{1}{2} + 1\frac{1}{4}$

l) $5\frac{3}{4} + 1\frac{3}{4}$

m) $4\frac{3}{4} - 1\frac{1}{2}$

n) $4\frac{1}{2} - 3\frac{3}{4}$

o) $4\frac{3}{4} + 2\frac{1}{2}$

2) Add and subtract these fractions.

a) $\frac{3}{5} + \frac{1}{5}$

b) $\frac{5}{7} + \frac{1}{7}$

c) $\frac{3}{8} + \frac{2}{8}$

d) $\frac{3}{10} + \frac{4}{10}$

e) $\frac{2}{9} + \frac{5}{9}$

f) $\frac{7}{13} + \frac{2}{13}$

g) $\frac{2}{3} - \frac{1}{3}$

h) $\frac{3}{5} - \frac{2}{5}$

i) $\frac{7}{9} - \frac{3}{9}$

j) $\frac{9}{11} - \frac{3}{11}$

k) $\frac{5}{16} - \frac{2}{16}$

l) $\frac{17}{20} - \frac{4}{20}$

3) Add and subtract these mixed numbers.

a) $3 + \frac{2}{5}$

b) $4 + 3\frac{5}{6}$

c) $4\frac{3}{8} - 1\frac{1}{8}$

d) $5\frac{3}{10} - \frac{2}{10}$

e) $\frac{7}{12} + \frac{4}{12}$

f) $8\frac{9}{11} - \frac{2}{11}$

g) $5\frac{5}{6} - 2\frac{4}{6}$

h) $6\frac{5}{8} + 2\frac{2}{8}$

i) $7\frac{1}{3} + 2\frac{1}{3}$

j) $9\frac{4}{5} - 2\frac{1}{5}$

k) $4\frac{1}{12} - 3\frac{1}{12}$

l) $8\frac{12}{20} + 3\frac{1}{20}$

Adding and Subtracting Fractions 2

Do not use a calculator

10b

1) Cancel down these fractions into their lowest terms.

- a) $\frac{2}{4}$ b) $\frac{2}{6}$ c) $\frac{5}{20}$ d) $\frac{3}{9}$ e) $\frac{5}{15}$ f) $\frac{4}{12}$ g) $\frac{3}{12}$
- h) $\frac{9}{12}$ i) $\frac{15}{20}$ j) $\frac{8}{20}$ k) $\frac{6}{16}$ l) $\frac{8}{18}$ m) $\frac{9}{15}$ n) $\frac{10}{25}$

2) Change these pairs of fractions into fractions having the same denominator.

- a) $\frac{3}{4}$ and $\frac{1}{2}$ b) $\frac{5}{8}$ and $\frac{1}{4}$ c) $\frac{3}{10}$ and $\frac{4}{15}$
- d) $\frac{7}{10}$ and $\frac{2}{5}$ e) $\frac{4}{9}$ and $\frac{1}{3}$ f) $\frac{5}{12}$ and $\frac{3}{8}$
- g) $\frac{1}{10}$ and $\frac{7}{15}$ h) $\frac{5}{7}$ and $\frac{5}{21}$ i) $\frac{7}{12}$ and $\frac{5}{18}$
- j) $\frac{9}{14}$ and $\frac{1}{21}$ k) $\frac{3}{14}$ and $\frac{3}{7}$ l) $\frac{5}{16}$ and $\frac{3}{20}$

3) Add together these pairs of fractions (simplify wherever necessary)

- a) $\frac{1}{8} + \frac{1}{4}$ b) $\frac{1}{3} + \frac{1}{6}$ c) $\frac{1}{5} + \frac{3}{10}$ d) $\frac{1}{8} + \frac{5}{16}$
- e) $\frac{2}{5} + \frac{4}{15}$ f) $\frac{3}{8} + \frac{5}{12}$ g) $\frac{7}{10} + \frac{2}{15}$ h) $\frac{3}{8} + \frac{5}{24}$
- i) $\frac{1}{10} + \frac{3}{4}$ j) $\frac{5}{16} + \frac{5}{12}$ k) $\frac{3}{12} + \frac{5}{8}$ l) $\frac{3}{10} + \frac{12}{25}$

4) Subtract these pairs of fractions (simplify wherever necessary)

- a) $\frac{3}{8} - \frac{1}{4}$ b) $\frac{5}{16} - \frac{1}{4}$ c) $\frac{7}{10} - \frac{1}{2}$ d) $\frac{3}{10} - \frac{1}{5}$
- e) $\frac{7}{16} - \frac{3}{8}$ f) $\frac{5}{8} - \frac{7}{16}$ g) $\frac{9}{10} - \frac{11}{20}$ h) $\frac{5}{8} - \frac{1}{12}$
- i) $\frac{4}{9} - \frac{5}{12}$ j) $\frac{7}{15} - \frac{3}{10}$ k) $\frac{11}{24} - \frac{5}{12}$ l) $\frac{13}{18} - \frac{5}{9}$

Calculating Percentages 1

10b

1) Calculate each of the following without using a calculator

- | | | |
|------------------|------------------|------------------|
| a) 50% of £2.50 | b) 50% of £12.40 | c) 25% of £12.00 |
| d) 25% of £14.00 | e) 75% of £14.00 | f) 75% of £8.00 |
| g) 10% of £5.40 | h) 5% of £5.40 | i) 15% of £5.40 |
| j) 10% of £7.20 | k) 5% of £7.20 | l) 15% of £7.20 |
| m) 10% of £8.30 | n) 20% of £8.30 | o) 30% of £8.30 |

2) Calculate each of the following without using a calculator. In each case write down 10% first

- | | | |
|-----------------|-----------------|-----------------|
| a) 15% of 400 | b) 35% of 600 | c) 45% of 900 |
| d) 65% of 200 | e) 85% of 800 | f) 95% of 500 |
| g) 12% of 440 | h) 24% of 220 | i) 48% of 550 |
| j) 54% of £7 | k) 84% of £7 | l) 96% of £7 |
| m) 15% of £2.40 | n) 45% of £9.60 | o) 65% of £4.40 |

3) Calculate each of the following without using a calculator. In each case write down 1% first

- | | | |
|---------------|-----------------|-----------------|
| a) 2% of 200 | b) 6% of 900 | c) 9% of 400 |
| d) 17% of 500 | e) 23% of 600 | f) 51% of 700 |
| g) 35% of 330 | h) 65% of 450 | i) 95% of 620 |
| j) 27% of £8 | k) 78% of £4 | l) 81% of £3 |
| m) 17% of £5 | n) 72% of £6.50 | o) 26% of £9.50 |

4) Use a calculator to work these out

- | | | |
|----------------------|-----------------------|-----------------------|
| a) 24% of 17kg | b) 13% of 34kg | c) 88% of 94kg |
| d) 52% of 32 metres | e) 17% of 28 metres | f) 72% of 16 metres |
| g) 35% of 8.7 litres | h) 23% of 36 litres | i) 54% of 45.2 litres |
| j) 82% of £37.50 | k) 95% of £45.80 | l) 65% of £83.60 |
| m) 72% of 53 metres | n) 43% of 87.2 metres | o) 61% of 17 metres |

Calculating Percentages 2

10b

- 1) In a sale, a computer is reduced in price by 15%. It normally costs £650.
 - a) Calculate the amount by which it is reduced in price.
 - b) Write down its new price.

- 2) In a sale a television is reduced in price by 23%. It normally costs £320.
 - a) Write down 10% of £320.
 - b) Now calculate 20% of £320.
 - c) Write down 1% of £320.
 - d) Now calculate 3% of £320.
 - e) Now use your answers to b and d to calculate 23% of £320.

- 3)
 - a) Calculate 10% of £58, without using a calculator.
 - b) Use this to write down 5% of £58.
 - c) Use this to write down $2\frac{1}{2}\%$ of £58.
 - d) Use these values to calculate $17\frac{1}{2}\%$ of £58.

- 4) Value Added Tax (VAT) is added to the cost of most things we buy.
The VAT on items is 17.5%. Use the method in question 3 to calculate the tax added on to each of these.
 - a) A motorbike costing £3000
 - b) A game costing £40

- 5) Charlotte earns £280 per week. She spends 18% of it on rent.
 - a) Write down 10% of £280.
 - b) Write down 1% of £280.
 - c) Now calculate 18% of £280.

- 6) There are 1,200 pupils at Megan's school. 55% are boys and the rest are girls.
 - a) What percentage of the pupils are girls?
 - b) How many girls attend the school?
 - c) How many boys are at the school?Some of the pupils go on a school trip. 20% of the boys go on the trip and 15% of the girls.
 - d) How many boys go on the trip?
 - e) How many girls go on the trip?

Fractions, Decimals and Percentages

10b

1) Change the following decimals into percentages

- | | | | | |
|----------|----------|-----------|----------|----------|
| a) 0.3 | b) 0.7 | c) 0.9 | d) 0.17 | e) 0.23 |
| f) 0.67 | g) 0.83 | h) 0.02 | i) 0.09 | j) 0.137 |
| k) 0.013 | l) 0.070 | m) 0.0713 | n) 0.237 | o) 0.841 |

2) Change each of the following percentages into fractions

Write down the answer in its lowest term

- | | | | |
|--------|---------------------|----------------------|----------------------|
| a) 10% | b) 50% | c) 40% | d) 80% |
| e) 90% | f) 25% | g) 75% | h) 45% |
| i) 35% | j) 55% | k) $33\frac{1}{3}\%$ | l) $66\frac{2}{3}\%$ |
| m) 18% | n) 54% | o) 38% | p) 24% |
| q) 5% | r) $2\frac{1}{2}\%$ | s) $7\frac{1}{2}\%$ | t) $17\frac{1}{2}\%$ |

3) Change these fractions into decimals

- | | | | | |
|-------------------|-------------------|--------------------|--------------------|--------------------|
| a) $\frac{1}{10}$ | b) $\frac{1}{2}$ | c) $\frac{1}{4}$ | d) $\frac{1}{5}$ | e) $\frac{1}{20}$ |
| f) $\frac{1}{50}$ | g) $\frac{1}{25}$ | h) $\frac{1}{100}$ | i) $\frac{1}{200}$ | j) $\frac{1}{250}$ |

4) Change these fractions into decimals

- | | | | | |
|--------------------|-------------------|-------------------|--------------------|---------------------|
| a) $\frac{3}{10}$ | b) $\frac{7}{10}$ | c) $\frac{3}{4}$ | d) $\frac{3}{100}$ | e) $\frac{23}{100}$ |
| f) $\frac{1}{500}$ | g) $\frac{3}{20}$ | h) $\frac{3}{40}$ | i) $\frac{7}{50}$ | j) $\frac{23}{50}$ |

5) Change each of these into (i) decimals and (ii) percentages

- | | | | | |
|---------------------|-------------------|--------------------|---------------------|-------------------|
| a) $\frac{9}{10}$ | b) $\frac{2}{5}$ | c) $\frac{11}{50}$ | d) $\frac{7}{20}$ | e) $\frac{9}{40}$ |
| f) $\frac{53}{100}$ | g) $\frac{3}{25}$ | h) $\frac{1}{50}$ | i) $\frac{17}{100}$ | j) $\frac{7}{25}$ |

Ratio and Proportion 1

10b

- 1) This ratio has been changed to its simplest form by dividing both sides by 100.

$$\begin{aligned} & 300 : 200 \\ & = 3 : 2 \end{aligned}$$

Write down these ratios in their simplest form

- a) 400 : 200 b) 50 : 20 c) 65 : 40 d) 90 : 75

- 2) A youth club has a total of 250 members. 150 are boys and the rest are girls.

Complete the lines below to show the ratio of the number of boys to the number of girls

$$\begin{aligned} & \text{Boys : Girls} \\ & 150 : \dots \\ & = \dots : \dots \end{aligned}$$

- 3) A car showroom sells 180 cars in a year. They sold 70 silver, 50 red and 30 blue.

Complete the lines below to show the ratio of the colours.

$$\begin{aligned} & \text{Silver : Red : Blue} \\ & 70 : \dots : \dots \\ & = \dots : \dots : \dots \end{aligned}$$

- 4) A piece of string is cut into two lengths in the ratio 2 : 1.

If the original length of the string was 45cm, what is the length of the two pieces?

- 5) £450 is shared between two people in the ratio 5 : 4. How much do they each get?

- 6) £650 is shared between Ellie and Jake. Ellie gets £300.

a) How much does Jake get?

b) Write down the ratio, Ellie : Jake, into which the money is split.

- 7) 10,500 people go to a football match. 8500 of the crowd are adults, the rest children.

a) How many children are at the match?

b) The ratio female to male adults is 2 : 3. How many men went to the match?

- 8) A length of string is cut into two pieces, $\frac{1}{4}$ of the way along. What is the ratio of the lengths of the two pieces?

Ratio and Proportion 2

10b

- 1) Divide each of the following amounts into the ratios given
- | | |
|----------------------------------|----------------------------------|
| a) £360 into the ratio 5 : 4 | b) £480 into the ratio 7 : 5 |
| c) £968 into the ratio 6 : 5 | d) £968 into the ratio 5 : 4 : 2 |
| e) £162 into the ratio 2 : 3 : 4 | f) £603 into the ratio 2 : 3 : 4 |
- 2) A length of rope is cut into two smaller lengths in the ratio 5:3
The longer of the two lengths is $7\frac{1}{2}$ metres
- How long is the smaller length?
 - What was the length of the original piece of rope?
- 3) A competition has three prize winners, 1st, 2nd and 3rd. An amount of money is divided between them in the ratio 5 : 3 : 1. If the person who came second gets £15, what are the other prizes?
- 4) An alloy is made from copper, tin and lead in the ratio 14 : 5 : 1
Calculate how much of each metal is in a piece of alloy weighing 280g
- 5) There are 12 black and 8 white discs in a bag. Some white discs are added
How many are needed in order to make the ratio of black to white discs 1 : 2?
- 6) Emily has 21 wooden cubes. She paints some of them black. Now the ratio of black to plain cubes is 1 : 6
- How many cubes has she painted?
 - How many more cubes should she paint in order to make the ratio 1 : 2?
- 7) Matthew has to cut a length of wood so that one piece is half the size of the other.
Into what ratio will he cut the wood?
- 8) A length of string is cut into two pieces. The smaller portion is $\frac{2}{5}$ of its original length.
- What proportion of the original length is the longer one?
 - Into what ratio has the string been cut?
- 9) 55% of the pupils at a school are girls
- What proportion of the pupils are boys?
 - If there are 715 girls in the school, how many pupils are there in total?

Checking

Do not use a calculator

10b

1) Estimate the size of each of these by rounding off

- | | | | |
|--------------------|--------------------|--------------------|---------------------|
| a) 12×53 | b) 19×41 | c) 27×23 | d) 38×51 |
| e) 57×77 | f) 106×23 | g) 88×46 | h) 73×126 |
| i) 53×205 | j) 73×216 | k) 420×74 | l) 295×181 |

2) Check these by estimating their size. Which are wrong?

- | | |
|------------------------------------|------------------------------------|
| a) 29×52 estimate 1500 | b) 32×78 estimate 2400 |
| c) 130×67 estimate 80,000 | d) 156×90 estimate 15,000 |
| e) 94×77 estimate 800 | f) 418×74 estimate 2800 |
| g) 91×130 estimate 10,000 | h) 86×205 estimate 18,000 |

3) By rounding off, estimate these divisions

- | | | | |
|------------------|------------------|------------------|-------------------|
| a) $122 \div 7$ | b) $288 \div 9$ | c) $413 \div 4$ | d) $362 \div 8$ |
| e) $221 \div 3$ | f) $459 \div 15$ | g) $713 \div 12$ | h) $482 \div 231$ |
| i) $883 \div 22$ | j) $289 \div 18$ | k) $528 \div 52$ | l) $672 \div 43$ |

4) Check which of these estimates are reasonable. Make a list of the wrong ones.

- | | |
|-------------------------------|-------------------------------|
| a) $413 \div 8$ estimate 50 | b) $438 \div 6$ estimate 70 |
| c) $224 \div 7$ estimate 50 | d) $150 \div 14$ estimate 30 |
| e) $1285 \div 31$ estimate 40 | f) $1300 \div 22$ estimate 75 |
| g) $233 \div 34$ estimate 70 | h) $1100 \div 8$ estimate 14 |

5) Check these subtractions by doing an inverse operation on them. Which are wrong?

- | | | |
|----------------------|----------------------|----------------------|
| a) $48 - 31 = 17$ | b) $83 - 49 = 34$ | c) $73 - 38 = 25$ |
| d) $154 - 78 = 76$ | e) $146 - 37 = 99$ | f) $463 - 78 = 385$ |
| g) $581 - 136 = 445$ | h) $273 - 187 = 186$ | i) $539 - 225 = 324$ |
| j) $738 - 368 = 370$ | k) $273 - 183 = 90$ | l) $773 - 428 = 345$ |

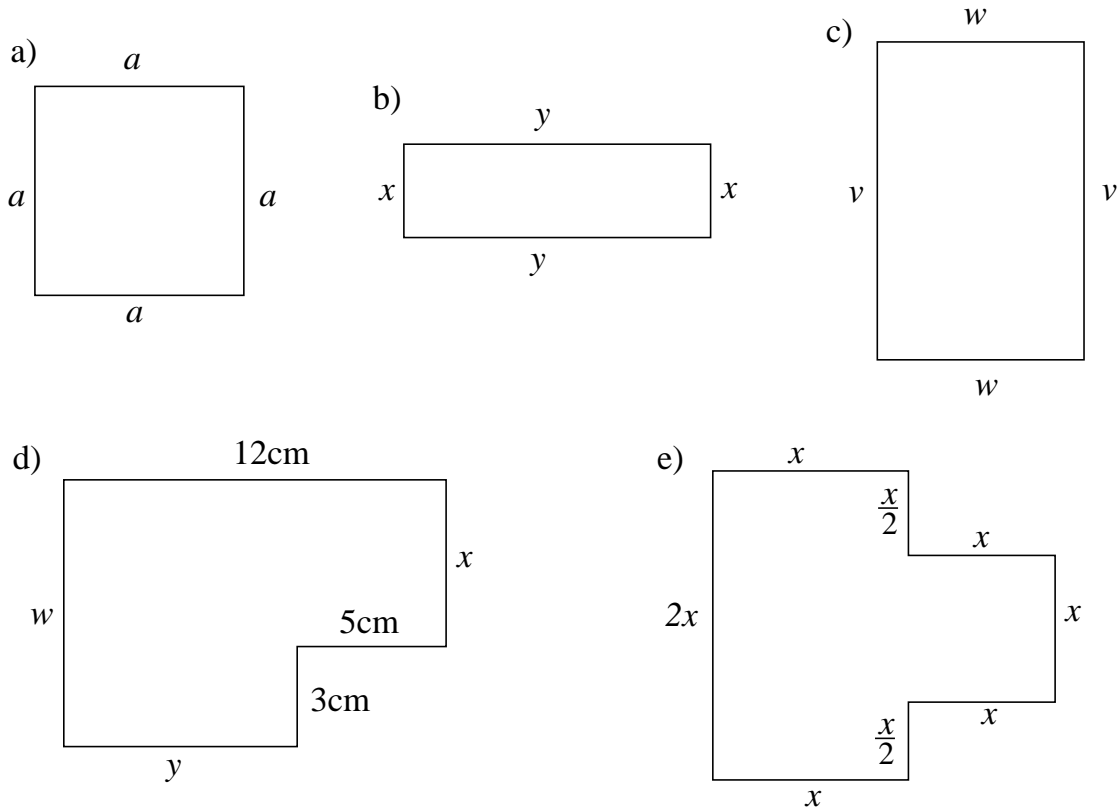
6) Check these divisions by doing an inverse operation on them. Which are wrong?

- | | | |
|------------------------|-------------------------|------------------------|
| a) $224 \div 7 = 32$ | b) $328 \div 8 = 41$ | c) $456 \div 6 = 56$ |
| d) $711 \div 9 = 71$ | e) $649 \div 11 = 59$ | f) $702 \div 13 = 54$ |
| g) $1848 \div 21 = 68$ | h) $1225 \div 25 = 71$ | i) $1749 \div 33 = 53$ |
| j) $968 \div 22 = 54$ | k) $2226 \div 31 = 106$ | l) $3995 \div 47 = 85$ |

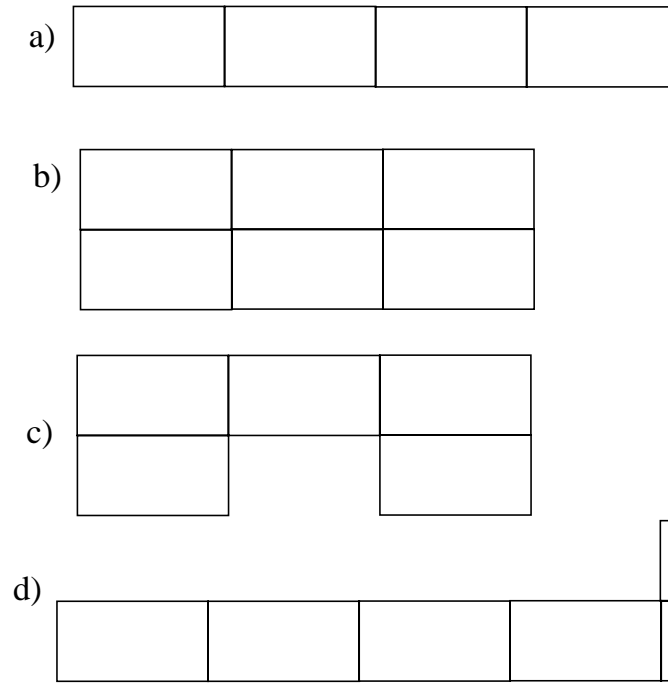
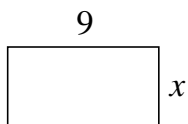
Adding Letters and Numbers

10b

1) Write down the perimeters of these shapes in the simplest way possible.



2) A tile has a length of 9cm and a width of x cm. What are the perimeters of these arrangements of tiles?



Simplifying Expressions 1

10b

1) Simplify each of these.

a) $5x + 3x$

b) $8y + 4y$

c) $7a - 2a$

d) $6p + p$

e) $c + 4c$

f) $3b - 2b$

g) $7c - 4c$

h) $5w - 5w$

i) $4t - 3t$

j) $7x - 2x$

k) $3y - y$

l) $4p - 2p$

2) Simplify each of these.

a) $2x + 2x + 3$

b) $5r + 22r + 4$

c) $6a - 2a + 5$

d) $4b + 6 - 7b$

e) $8y + 5 - 4y$

f) $5 + 6k + 2$

g) $4 - 5c + 3$

h) $4 + 4d - 3$

i) $4t + 3s - 2t$

j) $5n - 2 + 4n$

3) Simplify each of these.

a) $4a + 5 + 2a + 3$

b) $2b - 4 + 3b + 5$

c) $3x + 5 - x + 3$

d) $6b + 4 - 2b - 7$

e) $7n + 3 - 4n - 2$

f) $5k - 7 + 4k + 1$

g) $3c + 5 - 2c + 6$

h) $6d - 4 + 7d - 3$

i) $4t + 6s - 5t + 7s$

j) $7t + 8s - 4t + 1s$

4) Simplify each of these.

a) $5n + 3m - 2n - 2m$

b) $4k - 6j + 3k + j$

c) $2c + 4d - 3c + 6d$

d) $8d - 2e + 4d - 3e$

e) $5t + 4s - 4t + 7s$

f) $8t + 6s - 5t + s$

g) $7a + 3b + 5a + 3b$

h) $9x - 4y + 5x + 5y$

i) $8v + 2w - v + 3w$

j) $4p + 5q - 3p - 6q$

5) Simplify each of these.

a) $4 + 2m - 5 - 3m - 7 + 4m$

b) $5k - 7j + 3k + j - 5j + 4k$

c) $5c + 2d - 7c + 5d - 4c + 8d$

d) $4d - 6e + d - 6e - 3d + 4e$

e) $7t + 5s - 6t + 2s - t + 6s$

f) $3t + 7 - t + 5 - 5t + 6$

g) $4 + 6b + 7 + 4b - 8 + 5b$

h) $5x - 7y + 6x + 3y - 5x + y$

i) $6v + 8w - 3v + 5w - 2v + 4w$

j) $6c + 3 - 6 - 3c - 5c + 6$

k) $7c + 3d - c + 4d - 3c + d$

l) $5a + 7 - 5 - 7a - 3 + 4a$

Simplifying Expressions 2

10b

1) Simplify each of these.

a) $4 \times a$

b) $2 \times b$

c) $5 \times c$

d) $5 \times d$

e) $w \times 5$

f) $x \times 8$

g) $y \times 4$

h) $z \times 3$

i) $p \times p$

j) $q \times q$

k) $r \times r \times r$

l) $s \times s \times s$

m) $5 \times 4h$

n) $7 \times 5i$

o) $4 \times 2j$

p) $2 \times 3k$

q) $e \times 4e$

r) $f \times 5f$

s) $g \times 2g$

t) $h \times 3h$

u) $3l \times 2l$

v) $5m \times 4m$

w) $7n \times 3n$

x) $4p \times 8p$

2) Simplify each of these.

a) $6 \div 2$

b) $8 \div 4$

c) $12 \div 3$

d) $15 \div 5$

e) $8x \div 2$

f) $12x \div 4$

g) $20x \div 4$

h) $33x \div 3$

i) $y \div y$

j) $x \div x$

k) $3x \div x$

l) $4x \div x$

m) $8x \div 4x$

n) $10x \div 5x$

o) $12x \div 2x$

p) $9x \div 3x$

q) $9x \div 6x$

r) $12x \div 8x$

s) $15x \div 10x$

t) $21x \div 14x$

3) Look at these.

$2x - x$

x

$\frac{x}{2}$

x^3

$2x$

$2 \times x$

$x + 2$

$x - 2$

x^2

$x \div x$

a) Which two always give the same answer as $4x - 2x$?b) Which one always gives the same answer as $2 + x$?c) Which one is the same as $\frac{x}{x}$?d) Which one always gives the same answer as $x \times x \times x$?e) Which one always gives the same answer as $x \div 2$?

f) Which one always gives the answer 1 ?

g) Which one always gives the same answer as $x \times x$?h) Which two always give the same answer as $5x - 4x$?i) Which two always give the same answer as $x + x$?j) Which one always gives the same answer as $y \div y$?k) Which one simplifies $7x - 5 - 6x + 3$?l) Which one simplifies $4x + 5 - 3x - 3$?

Substitution 1

10b

1) Daniel works at the weekend. He is paid £5.70 for every hour he works.

He calculates his pay by using the formula:

$$\text{Pay} = \text{£}5.70 \times \text{the number of hours worked.}$$

This he simplifies to

$$P = 5.70 \times H$$

P represents his pay in pounds.

H represents the number of hours he works

Use this formula to calculate his pay when he works

- a) 8 hours b) 15 hours

2) Mrs. Patel has a plumber to mend her central heating. She asks two plumbers how much they charge.

Plumber A charges £70 plus £15 for each hour he spends doing the job.

This can be written as $C = 70 + 15 \times H$

Plumber B charges £50 plus £16 for each hour she spends doing the job.

This can be written as $C = 50 + 16 \times H$

- a) Calculate the cost of each plumber if the job takes 8 hours to do.
 b) What are the values of C when H is 15?
 c) Mrs Patel asks plumber B to do the job. She is charged £242. How long did the plumber take to do the job?

3) A second-hand bookshop sells paperbacks at 70p each and hardbacks at £1.50 each.

The shop owner makes this into a formula to calculate the cost:

$$C = 0.7p + 1.5h$$

where C is the cost of the books, p is the number of paperbacks sold and h is the number of hardbacks sold.

- a) Calculate the cost of 4 hardbacks and 7 paperbacks.
 b) What is the value of C when p is 4 and h is 2?
 c) A customer is charged £11. If she buys 5 paperbacks how many hardbacks does she buy?

Substitution 2

10b

1) The formula for calculating the area of a circle is

$$A = \pi r^2$$

‘A’ represents the area,

‘r’ represents the radius of the circle and $\pi = 3.142$.

Laura calculates the area of a circle whose radius is 5cm like this:

$$A = 3.142 \times 5 \times 5$$

$$A = 3.142 \times 25$$

So $A = 78.55$ square centimetres.

Use this formula to calculate:

a) the value of A when $r = 4$

b) the value of A when $r = 5.2$

c) the value of r when $A = 113.112$

2) If $C = 4x + 5y$ calculate the value of C in each of the situations below

a) $x = 4$ and $y = 6$

b) $x = 5$ and $y = 7$

c) $x = 12$ and $y = 34$

d) $x = 3.2$ and $y = 4.5$

e) $x = 7.4$ and $y = 3.95$

f) $x = 12.6$ and $y = 7.52$

3) If $w = 3a + 9b$ what is the value of w when $a = 3$ and $b = 11$?

4) If $p = 2x + 7y$ what is the value of p when $x = 14$ and $y = 9$?

5) If $c = n + 7m$ what is the value of c when $n = 5$ and $m = 4.2$?

6) If $r = 2.7s + 3.9t$ what is the value of r when $s = 4$ and $t = 6$?

7) If $v = 2u + 8w + 7$ what is the value of v when $u = 9$ and $w = 3$?

8) If $t = 2x - 3 + 7y$ what is the value of t when $x = 5$ and $y = 9$?

9) If $h = 9p + 7 - 2q$ what is the value of h when $p = 7$ and $q = 9$?

10) If $k = 4x + 3 + 5y - 2$ what is the value of k when $x = 4$ and $y = 7$?

11) If $s = p^2$ what is the value of s when $p = 3$?

12) If $h = a^2 + 9$ what is the value of h when $a = 5$?

13) If $c = 3d^2$ what is the value of c when $d = 7$?

14) If $z = 4 + y^2$ what is the value of z when $y = 4$?

15) If $j = 5m^2 + 9$ what is the value of j when $m = 3$?

16) If $t = 3s^2 + 9u$ what is the value of t when $s = 2$ and $u = 7$?

Brackets 1

10b

1) Calculate the value of each of the following.

- | | | |
|----------------|----------------|----------------|
| a) $4(3 - 1)$ | b) $5(3 + 4)$ | c) $7(8 - 4)$ |
| d) $5(3 + 2)$ | e) $6(2 + 5)$ | f) $3(10 - 2)$ |
| g) $2(7 - 3)$ | h) $5(5 - 2)$ | i) $4(4 + 2)$ |
| j) $7(-3 + 2)$ | k) $7(5 - 3)$ | l) $5(-4 + 7)$ |
| m) $7(-2 + 5)$ | n) $8(-3 - 6)$ | o) $4(-5 - 7)$ |
| p) $3(3 - 5)$ | q) $5(7 - 7)$ | r) $9(4 - 9)$ |

2) Look at these expressions.

- | | | |
|----------------|----------------|-----------------|
| a) $2(x + 1)$ | b) $-4x + 8$ | c) $3(x - 2)$ |
| d) $x(x + 1)$ | e) $x(2x + 3)$ | f) $x^2 + x$ |
| g) $2x + 2$ | h) $18x - 24$ | i) $4(2x - 3)$ |
| j) $20 - 5x$ | k) $4(-x + 2)$ | l) $3x - 6$ |
| m) $8x - 12$ | n) $5(4 - x)$ | o) $3(x^2 + 6)$ |
| p) $2x^2 + 3x$ | q) $6(3x - 4)$ | r) $3x^2 + 18$ |

Which pairs will always give the same answer?

3) Write down expressions equal to these but without the brackets.

- | | | |
|------------------|-----------------|-----------------|
| a) $2(5 - y)$ | b) $3(4 + a)$ | c) $5(4 - x)$ |
| d) $b(2 - b)$ | e) $c(3 - 2c)$ | f) $y(5 - y)$ |
| g) $d(7 - d)$ | h) $p(2p + 1)$ | i) $g(3g + 4)$ |
| j) $2t(t - 2)$ | k) $5r(2r - 4)$ | l) $2h(3h - 5)$ |
| m) $4x(3x - 7x)$ | n) $6y(5 + 2y)$ | o) $4t(2 + 3t)$ |

4) Write down each of the following expressions in their simplest form.

- | | |
|----------------------------|----------------------------|
| a) $(y + 2) + (2y - 1)$ | b) $(x + 2) + (5 + 2x)$ |
| c) $(5 - a) + (3a - 3)$ | d) $(a + 7) + (5a - 3)$ |
| e) $(2b + 4) + (3b + 5)$ | f) $(a - 5) + (a - 8)$ |
| g) $(2d + 4) + (4d - 2)$ | h) $(2x - 2) + (6x - 4)$ |
| i) $(3y - 2) + (4y + 3)$ | j) $(5x - 3) + (4x - 2)$ |
| k) $(7a + 3b) + (2a - b)$ | l) $(3a - 2b) + (4a + 7b)$ |
| m) $(3x + 2y) + (2x + y)$ | n) $(3x + 6y) + (8x - 4y)$ |
| o) $(6y + 4x) + (5y - 3x)$ | p) $(4a - 2b) + (5a + 4b)$ |

Brackets 2

10b

1) Write down each of the following expressions in their simplest form.

a) $(4y + 2) + (3y + 3)$

b) $(5y + 7) + (3y - 2)$

c) $(3a + 5) + (4a - 6)$

d) $(3a - 2) + (4a + 6)$

e) $(4x - 5) + (6x + 4)$

f) $(8x - 7) + (6x - 9)$

g) $(6x + 7y) + (4x - 3y)$

h) $(5a - 7b) + (5a - 6b)$

2) Write down these expressions in their simplest form without the brackets.

a) $7 - (-4)$

b) $8 - (-3)$

c) $5 - (-8)$

d) $5 - (-9)$

e) $4x - (-x)$

f) $9y - (-2y)$

g) $4a - (-8a)$

h) $8b - (-3b)$

i) $5a - (-2)$

j) $8 - (-3b)$

k) $8 - (-4b)$

l) $9 - (-3y)$

m) $7 - (-4b)$

n) $9 - (-2b)$

o) $9 - (-6y)$

3) Write down these expressions without the brackets.

a) $-(3 + 5)$

b) $-(-3 - 7)$

c) $-(-5 - 6)$

d) $-(3 + 4)$

e) $-(3b + 4)$

f) $-(-5a - 6)$

g) $-(7d - 4x)$

h) $-(-3x - 5)$

i) $-(-6y + 4x)$

4) Simplify these as much as you can.

a) $(4 + 1) - (2 - 5)$

b) $(6 + 9) - (4 - 2)$

c) $(4 + 4) - (3 - 7)$

d) $(4 + 6) - (4 + 7)$

e) $(5 + 7) - (4 + 2)$

f) $(6 + 5) - (6 + 2)$

g) $(-4 + 6) - (4 - 7)$

h) $(6 + 4) - (-5 - 7)$

i) $(4 - 6) - (-7 + 2)$

j) $(6 - 4) - (-7 + 5)$

5) Simplify these as much as you can.

a) $(3y + 4) - (5y + 3)$

b) $(6a + 4) - (6a + 1)$

c) $(7x + 4) - (2x + 5)$

d) $(8c + 4) - (5c - 3)$

e) $(5b + 6) - (4b - 6)$

f) $(5y + 7) - (4y - 6)$

g) $(7a + 5) - (a - 6)$

h) $(8x + 6) - (3x + 4)$

i) $(5c + 4) - (c + 7)$

j) $(2 + 5a) - (6 - 8a)$

k) $(6 + 7x) - (3 - 8x)$

l) $(6 + 4c) - (6 - c)$

Multiplying a Bracket by a Bracket

10b

1) $(7 + 2) \times (4 + 3)$

This means 'multiply the value of the first bracket by the value of the second'

$$\begin{aligned} \text{So } (7 + 2) \times (4 + 3) \\ &= 9 \times 7 \\ &= 63 \end{aligned}$$

Now do these in the same way.

a) $(5 + 6) \times (3 + 7)$

b) $(3 + 4) \times (5 + 7)$

c) $(2 + 4) \times (1 + 6)$

d) $(4 + 6) \times (8 + 4)$

e) $(8 + 2) \times (3 + 4)$

f) $(5 + 8) \times (9 + 2)$

2) $(7 + 2) \times (4 + 3)$ can be calculated in another way, like this:

Multiply 7 by $(4 + 3)$, then 2 by $(4 + 3)$ then add the results together, like this

$$\begin{aligned} 7 \times (4 + 3) + 2 \times (4 + 3) \\ &= 7 \times 7 + 2 \times 7 \\ &= 49 + 14 \\ &= 63 \end{aligned}$$

Now do these in the same way.

a) $(3 + 5) \times (2 + 5)$

b) $(8 + 5) \times (4 + 9)$

c) $(4 + 5) \times (5 + 8)$

d) $(4 + 5) \times (6 + 8)$

e) $(6 + 8) \times (3 + 5)$

f) $(6 + 2) \times (5 + 8)$

3) Do these in the same way as question 2. Here is an example.

$$\begin{aligned} (3 + x) \times (2 + 5) \\ &= 3 \times (2 + 5) + x \times (2 + 5) \\ &= 3 \times 7 + x \times 7 \\ &= 21 + 7x \end{aligned}$$

a) $(2 + x) \times (4 + 7)$

b) $(x + 4) \times (6 + 2)$

c) $(x + 3) \times (2 + 5)$

d) $(6 + x) \times (2 + 4)$

e) $(7 + x) \times (9 + 3)$

f) $(4 + x) \times (6 + 7)$

g) $(3 + 5) \times (x + 9)$

h) $(4 + 2) \times (x + 5)$

i) $(8 + 9) \times (x + 3)$

j) $(2 + 4) \times (7 + x)$

k) $(9 + 2) \times (2 + x)$

l) $(3 + 1) \times (4 + x)$

4) Do these in the same way as questions 2 and 3.

a) $(5 + x) \times (4 + x)$

b) $(2 + x) \times (6 + x)$

c) $(5 + x) \times (7 + x)$

d) $(x + 4) \times (x + 5)$

e) $(x + 3) \times (x + 6)$

f) $(x + 3) \times (x + 7)$

g) $(8 + x) \times (x + 1)$

h) $(x + 5) \times (8 + x)$

i) $(x + 9) \times (5 + x)$

j) $(6 + x) \times (x + 5)$

k) $(x + 7) \times (8 + x)$

l) $(3 + x) \times (x + 6)$

Finding the Missing Expression

10b

- 1) Each of these expressions has been simplified. Part has been left out each time. Write down what is missing. An example has been done.

$$3a + 4 - \dots = 3a + 2$$

Answer is $3a + 4 - 2$

a) $3p + 4 - \dots = 3p + 1$

b) $5r + 3 - \dots = 5r + 2$

c) $7f - 4 - \dots = 7f - 9$

d) $3g - 2 + \dots = 3g + 6$

e) $3k + 14 - \dots = 3k + 4$

f) $5m - 6 - \dots = 5m - 13$

g) $5a + 3 - \dots = 2a + 3$

h) $5d + 7 + \dots = 6d + 7$

i) $2a + 4 - \dots = a + 4$

j) $5x - 2 + \dots = 12x - 2$

k) $4y - 7 + \dots = 7y - 7$

l) $4x + 8 - \dots = 3x + 8$

- 2) Fill in the blanks in each of the following. An example has been done.

$$5a + 4 = 2a + \dots$$

Answer is $2a + 3a + 4$

a) $6y - 7 = 3y + \dots$

b) $7c - 3 = 5c + \dots$

c) $7w - 4 = w + 1 + \dots$

d) $4c + 5 = c - 2 + \dots$

e) $6w + 8 = 4w + \dots$

f) $3s - 5 = 2s + \dots$

g) $6x + 8 = 3x + \dots$

h) $4y - 6 = 5y - \dots$

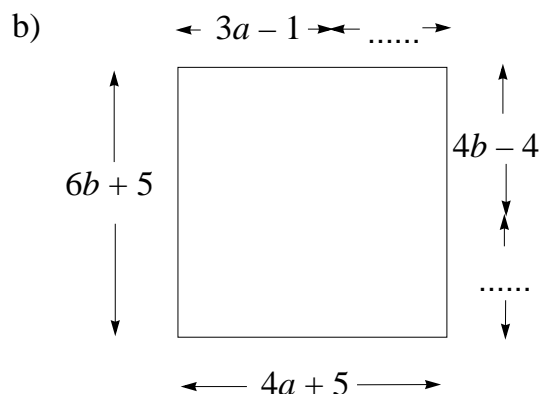
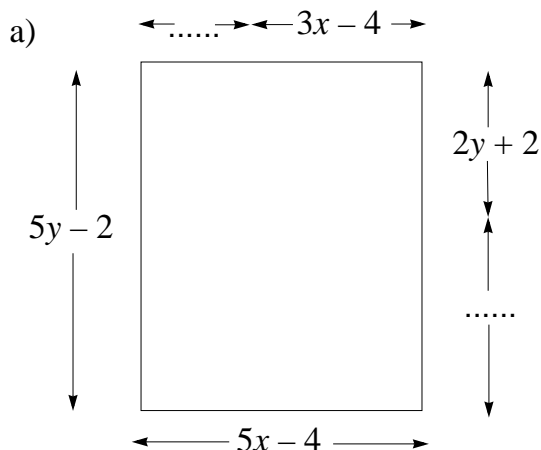
i) $3a - 3 = 7a - \dots$

j) $5b + 7 = 2b + \dots$

k) $4y + 4 = 6y - \dots$

l) $8x + 9 = 3x + \dots$

- 3) Write down an expression for each of the missing lengths in these rectangles. Write down each expression as simply as possible.



Equations 1

10b

- 1) a) A number has 6 added to it. The result is 14. What was the number?
 b) A number is doubled. 7 is subtracted from it. If the result is 13, what was the number?
 c) A number is halved. 4 is added to it. The result is 11. What was the number?
 d) A number is multiplied by 3 then 4 is added making 16. What is the number?

In these, check all your answers by substituting into the original equation.

2) Solve each of these equations.

- | | | |
|------------------|------------------|-----------------|
| a) $9 = x - 6$ | b) $4 = 18 - x$ | c) $x - 5 = 14$ |
| d) $30 = x + 16$ | e) $40 = 54 - x$ | f) $x - 8 = 3$ |
| g) $5 = x + 3$ | h) $9 = 4 + x$ | i) $x + 7 = 15$ |
| j) $5 = x - 2$ | k) $6 = 9 - x$ | l) $x - 4 = 13$ |
| m) $31 = x + 21$ | n) $15 = 36 - x$ | o) $x - 23 = 7$ |

3) Solve each of these equations.

- | | | |
|---------------|---------------|---------------|
| a) $6x = 18$ | b) $4x = 32$ | c) $7x = 42$ |
| d) $36 = 3x$ | e) $48 = 8x$ | f) $60 = 4x$ |
| g) $9x = 81$ | h) $5x = 95$ | i) $84 = 6x$ |
| j) $108 = 9x$ | k) $104 = 8x$ | l) $105 = 7x$ |
| m) $8x = 120$ | n) $7x = 175$ | o) $162 = 6x$ |

4) Solve each of these equations.

- | | | |
|--------------------|-------------------|-------------------|
| a) $4a - 3 = 9$ | b) $3a - 5 = 13$ | c) $2a - 6 = 40$ |
| d) $61 = 7a + 12$ | e) $37 = 4a - 7$ | f) $81 = 6a - 9$ |
| g) $5a - 4 = 21$ | h) $6a - 15 = 45$ | i) $4a - 17 = 63$ |
| j) $109 = 9a + 10$ | k) $77 = 7a - 14$ | l) $53 = 4a - 11$ |
| m) $8a + 9 = 81$ | n) $7a + 30 = 79$ | o) $9a + 21 = 93$ |

5) Solve each of these equations.

- | | |
|-----------------------|------------------------|
| a) $4a + 3 = 2a + 7$ | b) $7a - 9 = 3a + 3$ |
| c) $5a - 6 = 3a + 4$ | d) $8a + 6 = 4a + 22$ |
| e) $9a - 16 = 5a - 8$ | f) $4a + 7 = 7a - 8$ |
| g) $6a + 12 = 9a - 6$ | h) $5a - 17 = 2a + 28$ |
| i) $9a - 17 = 3a + 1$ | j) $4a + 4 = 3a + 14$ |
| k) $7a - 6 = 4a - 18$ | l) $6a + 2 = 3a + 23$ |

Equations 2

10b

- 1) a) A number has 3 added to it. The result is doubled to make 16. What is the number?
- b) A number has 2 added to it. The result is multiplied by 3 to make 27. What is the number?
- c) A number is subtracted from 8. The result is doubled to make 10. What is the number?
- d) A number has 9 subtracted from it. The result is multiplied by 4 to make 8. What is the number?

In these, check all your answers by substituting into the original equation.

2) Solve each of these equations.

- | | | |
|---------------------|---------------------|--------------------|
| a) $2(x + 4) = 14$ | b) $3(x + 5) = 27$ | c) $4(x + 7) = 40$ |
| d) $7(x - 3) = 14$ | e) $6(x - 4) = 36$ | f) $5(x - 8) = 20$ |
| g) $6(3 + x) = 48$ | h) $5(6 + x) = 55$ | i) $7(5 + x) = 63$ |
| j) $4(12 - x) = 28$ | k) $7(10 - x) = 35$ | l) $6(9 - x) = 30$ |
| m) $11(5 + x) = 88$ | n) $5(8 + x) = 60$ | o) $7(4 + x) = 91$ |
| p) $4(6 - x) = 16$ | q) $7(11 - x) = 21$ | r) $8(9 - x) = 32$ |

3) Solve each of these equations.

- | | |
|--------------------------------|-------------------------------|
| a) $3(x + 2) + 2x = 31$ | b) $4(x + 7) + 2x = 52$ |
| c) $4(x - 1) + 2x = 32$ | d) $6(x + 1) + 3x = 69$ |
| e) $5(x - 5) + 3(x - 2) = 25$ | f) $5(x + 5) - 3(x + 4) = 25$ |
| g) $8(x - 5) - 2(x + 4) = 6$ | h) $9(x - 4) - 3(x + 3) = 15$ |
| i) $10(x - 2) + 4(x + 4) = 80$ | j) $5(x + 7) + 4(x - 2) = 54$ |
| k) $8(x - 3) + 4(x - 2) = 16$ | l) $5(x + 9) - 3(x + 6) = 35$ |
| m) $8(x - 1) - 4(x + 4) = 4$ | n) $8(x - 2) - 3(x + 2) = 8$ |

4) Solve each of these equations.

- | | |
|---------------------------|--------------------------|
| a) $3(x + 1) = 4x$ | b) $4(x + 3) = 8x$ |
| c) $9(x - 4) = 3x$ | d) $2(x + 5) = 7x$ |
| e) $5(x + 1) = 2(x + 10)$ | f) $6(x - 2) = 4(x + 1)$ |
| g) $4(x - 2) = 2(x + 3)$ | h) $8(x - 7) = 4(x - 5)$ |
| i) $9(x - 2) = 3(x + 2)$ | j) $9(x - 4) = 3(x + 2)$ |
| k) $3(x - 4) = 2(x + 2)$ | l) $6(x - 5) = 2(x + 3)$ |

Equations 3

10b

1) Solve each of these equations.

a) $3 = \frac{y}{4}$

b) $4 = \frac{y}{2}$

c) $6 = \frac{y}{3}$

d) $5 = \frac{y}{7}$

e) $6 = \frac{y}{4}$

f) $7 = \frac{y}{5}$

g) $\frac{y}{5} = 3$

h) $\frac{y}{5} = 5$

i) $\frac{y}{6} = 4$

j) $\frac{y}{3} = 7$

k) $\frac{y}{6} = 8$

l) $\frac{y}{7} = 7$

2) Solve each of these equations.

a) $4.5 = \frac{x}{6}$

b) $5.5 = \frac{x}{6}$

c) $7.5 = \frac{x}{6}$

d) $8 = \frac{x}{8.5}$

e) $6 = \frac{x}{3.5}$

f) $7 = \frac{x}{2.5}$

g) $\frac{y}{7} = 0.5$

h) $\frac{y}{5} = 0.7$

i) $\frac{y}{7} = 0.9$

j) $\frac{y}{0.4} = 7$

k) $\frac{y}{0.3} = 8$

l) $\frac{y}{0.5} = 9$

3) Solve each of these equations.

a) $\frac{y+9}{3} = y+1$

b) $\frac{y+4}{4} = y-2$

c) $\frac{y+4}{3} = y-4$

d) $\frac{y+11}{2} = y+4$

e) $\frac{y+4}{3} = y-6$

f) $\frac{y+6}{6} = y-4$

g) $\frac{y+12}{3} = y+2$

h) $\frac{y+18}{4} = y+3$

i) $\frac{y+6}{2} = y-6$

j) $\frac{y+8}{5} = y-8$

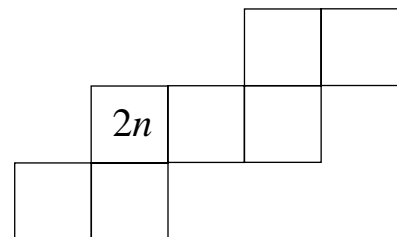
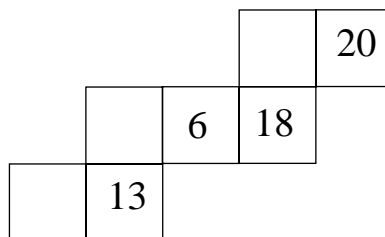
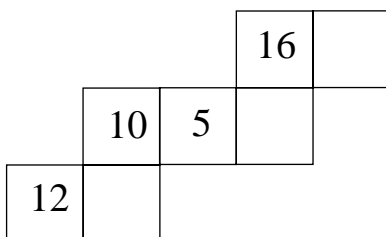
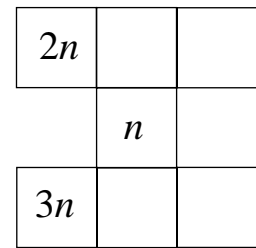
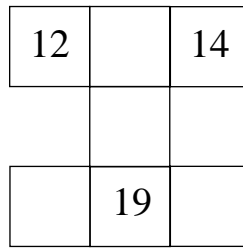
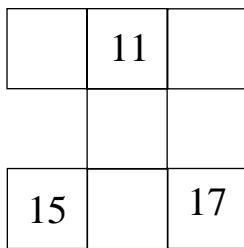
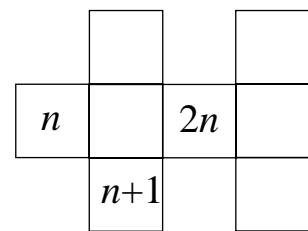
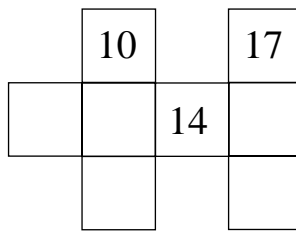
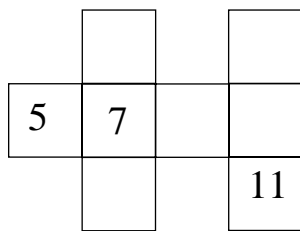
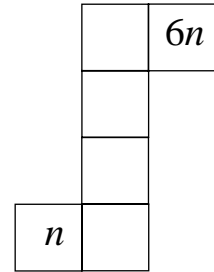
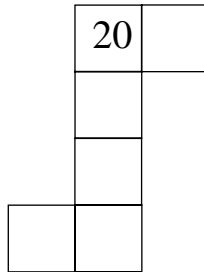
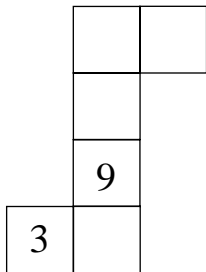
k) $\frac{y+16}{3} = y+4$

l) $\frac{y+15}{2} = y+6$

Number Rules

10b

In each of the following, the last diagram shows the rule for the other two.
Complete the diagrams



Number Grid

10b

Rachel investigates a number pattern. She puts a box around three numbers on the number grid and adds them together.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51
.....

She enters all this information in the table shown below. The box highlights the numbers 2, 13, and 24.

She then moves the box over 3 more numbers. Two of the numbers are 14 and 25; what is the other?

She does it a number of times. Copy this table and complete it.

1st number	2nd number	3rd number	Sum of the numbers
2	13	24	
14	25		
28			
	15		
			99
66			
		78	
<i>n</i>			

Number Patterns 1

10b

1) In each of these number patterns write down the next two numbers. Explain what is happening each time.

a) 3, 6, 9, 12, 15,

c) 5, 10, 15, 20, 25,

e) 4, 7, 10, 13, 16,

g) 9, 13, 17, 21, 25,

i) 21, 18, 15, 12, 9,

k) 30, 25, 20, 15, 10,

m) 5, 2, -1, -4, -7,

o) 7, 4, 1, -2, -5,

q) -12, -9, -6, -3, 0,,

s) -9, -8, -6, -3, 1,,

b) 12, 14, 16, 18, 20,,

d) 17, 20, 23, 26, 29,,

f) 20, 22, 25, 29, 34,,

h) 34, 36, 40, 46, 54,,

j) 40, 37, 34, 31, 28,,

l) 61, 54, 47, 40, 33,,

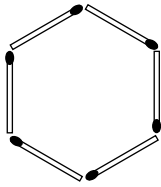
n) -20, -18, -16, -14, -12,,

p) -31, -19, -7, 5, 17,,

r) -10, -8, -6, -4, -2,,

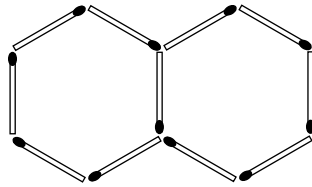
t) -17, -15, -12, -8, -3,,

2) The diagram shows hexagons made from matchsticks.



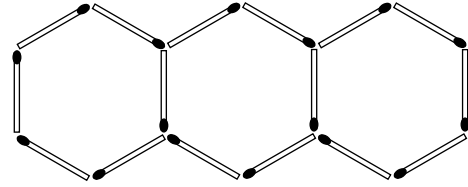
1 Hexagon

6 Matchsticks



2 Hexagons

11 Matchsticks



3 Hexagons

16 Matchsticks

a) How many matchsticks are needed to make 4 hexagons?

b) How many matchsticks are needed to make 8 hexagons?

c) Write in words how you calculate the number of matchsticks you need if you know the number of hexagons.

d) h represents the number of hexagons. m represents the number of matchsticks.

Which of these is the rule for calculating the number of matchsticks needed?

$m = 6h + 1$

$m = 6h$

$m = 5h + 1$

$m = h + 55$

$m = 5h + 6$

e) Use the rule to calculate the number of matchsticks needed to make 14 hexagons.

f) How many hexagons are made with 86 matchsticks?

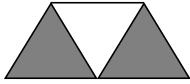
g) If I have 118 matchsticks, how many hexagons can I make and how many matchsticks are left over?

Number Patterns 2

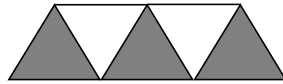
10b

The diagrams show how patterns are made from triangular tiles.

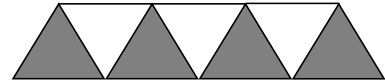
1st pattern



2nd pattern



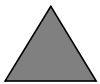
3rd pattern



- How many dark tiles and how many white ones will be in the next pattern?
- How many tiles of each colour will be needed in the 6th pattern?

These diagrams show how triangles can be made from smaller triangles.

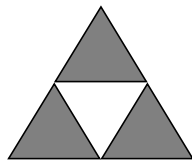
1st pattern



1 dark tile

0 white tiles

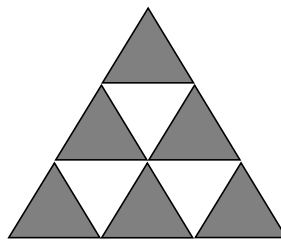
2nd pattern



3 dark tiles

1 white tiles

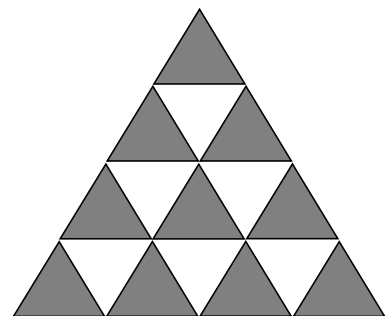
3rd pattern



6 dark tiles

3 white tiles

4th pattern



10 dark tiles

6 white tiles

- How many dark tiles and how many white ones will be in the next pattern?
- How many tiles of each colour will be needed in the 6th pattern?
- This shows the number of dark tiles in each pattern. Write down the next two.

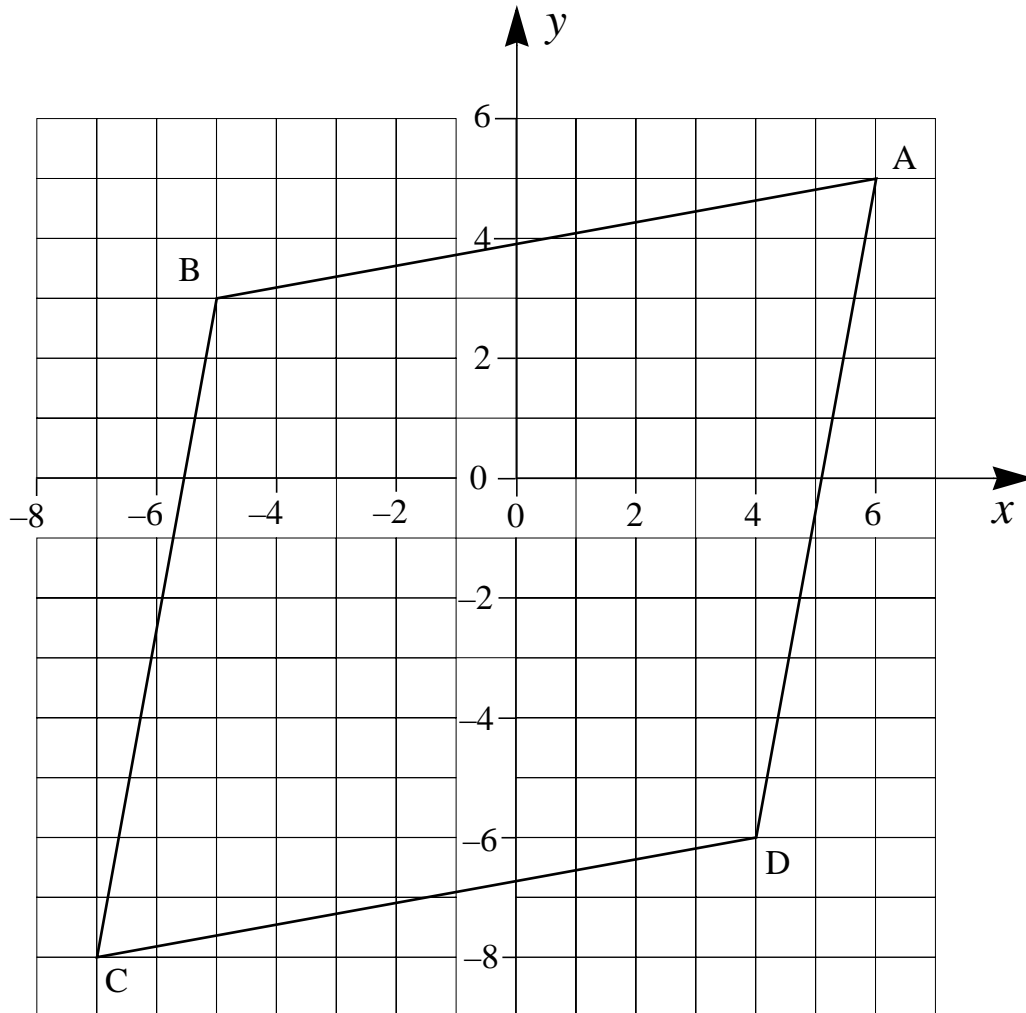
$$1 \quad 1 + 2 \quad 1 + 2 + 3$$

- How many dark tiles will be needed for the 10th pattern?
- What sequence do the white tiles follow?
- How many white tiles will be needed for the 10th pattern?
- How many tiles will be in the 10th pattern?
- What number sequence do the perimeter tiles follow?

Negative Co-ordinates 1

10b

- 1) a) What is the name given to the shape below?
 b) Write down the co-ordinates of the corners A, B, C and D..



- c) Draw this diagram on squared paper.
 d) On the squared paper plot the points $E(4,3)$, $F(-3, 1)$ and $G(-5,-6)$. Join the points E to F and F to G with two straight lines.
 e) These two lines form two sides of a rhombus. Draw in the other two sides.
 What are the co-ordinates of the fourth corner, H?
 f) Are the lines AB and EF parallel? Explain your answer.
 g) Are the lines CD and GH parallel? Explain your answer.
 h) Are shapes ABCD and EFGH similar? Explain your answer.

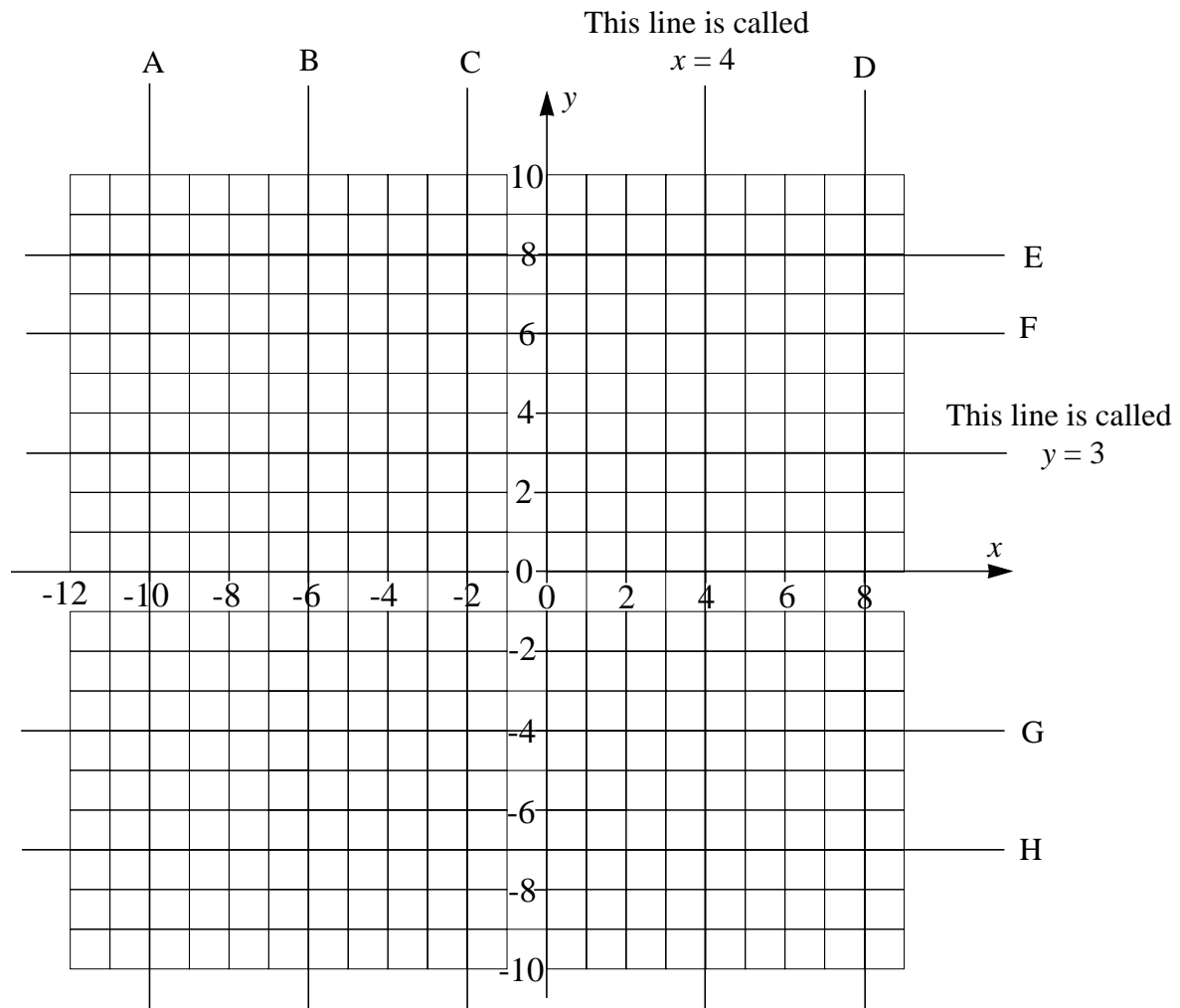
Negative Co-ordinates 2

10b

- 1) a) Plot the points $A(6,0)$, $B(0,6)$, $C(-6,0)$ and $D(0,-6)$. Both your x and y axes need to go from -6 units to 6 units.
- b) Join together with straight lines the points A to B , B to C , C to D and D to A .
- c) What type of shape have you drawn?
- d) What is the area of the shape in square units?
- e) What are the co-ordinates of the centre of this shape?
- 2) a) Plot the points $A(6,6)$, $B(-6,6)$, $C(-6,-6)$ and $D(6,-6)$. Both your x and y axes need to go from -6 units to 6 units.
- b) Join together with straight lines the points A to B , B to C , C to D and D to A .
- c) What type of shape have you drawn?
- d) What is the area of the shape in square units?
- e) Compare the area of this shape with that of question 1. Write down what you find.
- 3) Three corners of a rectangle are represented by the co-ordinates $(1,4)$, $(-5,4)$ and $(-5,-4)$
- a) Plot these points.
- b) What are the co-ordinates of the other corner?
- c) What are the co-ordinates of the centre of this shape?
- d) What is the area of this shape?
- 4) Three corners of a parallelogram are $A(2,3)$, $B(1,-1)$ and $C(-6,-3)$.
- a) With an x axis of -7 to 3 and a y axis of -4 to 4 , plot the three points.
- b) What are the co-ordinates of the fourth corner?
- c) What are the co-ordinates of the point where the diagonals cross?
- d) What is the area of this shape?
- 5) a) What type of triangle has vertices with co-ordinates $(0,1)$, $(-2,5)$ and $(-4,1)$?
- b) Draw this shape on squared paper. Show clearly the x and y axes.
- c) Show the line $y = 1$
- d) Draw the reflection of the triangle about the line $y = 1$.
- e) What type of quadrilateral do these two triangles make?
- f) What is the area of this quadrilateral?
- g) What are the co-ordinates of the centre of this shape?

Negative Co-ordinates 3

10b



All straight lines on the x and y axes have names.

Two lines have been named for you. They are $y = 3$ and $x = 4$

a) What are the names of the other lines A to H?

b) Complete these:

The x axis is called $y = \dots$

The y axis is called $x = \dots$

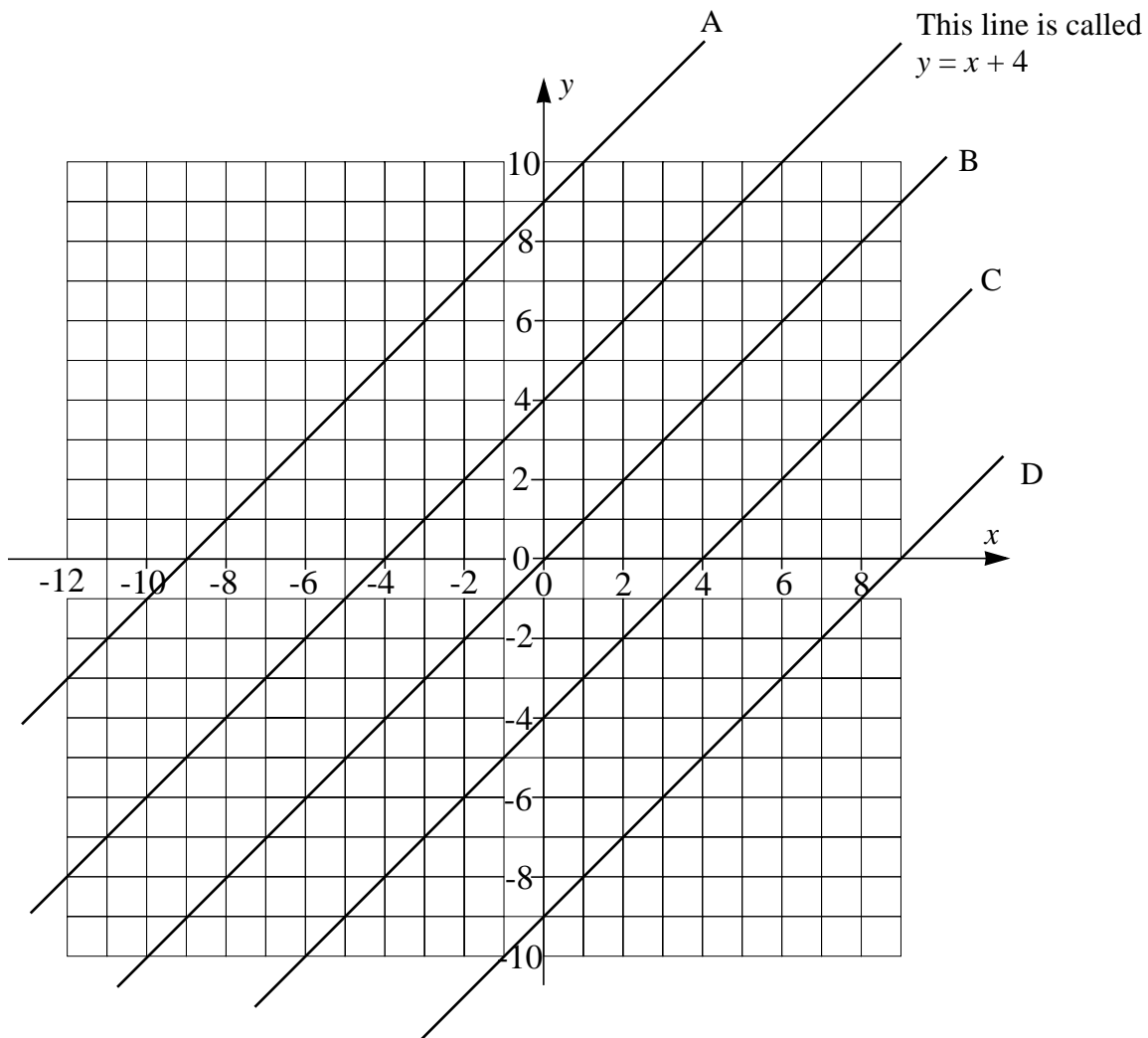
c) Complete these:

The line $y = -7$ is parallel to the \dots axis.

The line $x = -6$ is \dots to the \dots axis.

Negative Co-ordinates 4

10b



These lines all have the same gradient.

One line has a name. It goes through the y axis at $y = 4$ so its name is $y = x + 4$.

a) What are the names of all the other lines?

b) Finish this off:

All the lines have the same gradient so they are to each other.

c) What angle do the lines make with the y axis?

d) What angle do the lines make with the x axis?

c) What is the gradient of these lines?

Trial and Improvement 1

Do not use a calculator

10b

Guessing and trying.

Question.

Two numbers multiplied together give 203. One is 7; what is the other?

We normally do this as a divide, but it can be done by guessing and multiplying.

1st guess. Try something simple first.

$$7 \times 20 = 140 \quad \text{This is too low.}$$

2nd guess. Try something else.

$$7 \times 30 = 210 \quad \text{This is too high but close.}$$

3rd guess. Try going down a little.

$$7 \times 29 = 203 - \text{Correct. So the other number is 29.}$$

Here are three ways of multiplying without a calculator

$$\begin{array}{r} \overset{6}{2}9 \\ \times 7 \\ \hline 203 \end{array}$$

$$\begin{array}{r} 29 \\ \times 7 \\ \hline 203 \\ \underset{6}{} \end{array}$$

$$\text{So } \begin{array}{r} 20 \times 7 = 140 \\ 9 \times 7 = 63 \\ \hline 29 \times 7 = 203 \end{array}$$

Do these by the guessing and multiplying method.

- 1) Two numbers multiplied together give 306. One is 9, what is the other?
- 2) Two numbers multiplied together give 264. One is 11, what is the other?
- 3) Two numbers multiplied together give 585. One is 13, what is the other?
- 4) Two numbers multiplied together give 378. One is 14, what is the other?
- 5) Two numbers multiplied together give 612. One is 18, what is the other?
- 6) Two numbers multiplied together give 544. One is 16, what is the other?
- 7) Two numbers multiplied together give 1035. One is 23, what is the other?
- 8) Two numbers multiplied together give 924. One is 21, what is the other?
- 9) Two numbers multiplied together give 578. One is 17, what is the other?

Trial and Improvement 2

10b

Guessing and trying.

Example.

Calculate the square root of 57.76 without using the square root function on the calculator.

Try $7 \times 7 = 49$	too low
Try $7.2 \times 7.2 = 51.84$	too low but nearer
Try $7.4 \times 7.4 = 54.76$	still too low but nearer
Try $7.6 \times 7.6 = 57.76$	correct

So the square root of 57.76 is 7.6

1) Calculate the square roots of these numbers by guessing and trying. Write down all your attempts.

a) 7.29	b) 12.96	c) 24.01	d) 53.29
e) 67.24	f) 40.96	g) 77.44	h) 88.36

2) A rectangle is twice as long as it is wide. Its area is 11.52 square centimetres. What are its dimensions?

3) A rectangle and a square have the same perimeter. The rectangle is twice as long as it is wide. The area of the square is 70.56 square centimetres.

- a) By guessing and trying, calculate the length of one side of the square.
- b) Which has the greater area, the rectangle or the square?

4) x and y are two numbers.

- a) x and y are equal. When multiplied together they give 153.76. What are the values of x and y ?
- b) x is twice as big as y . When multiplied together they give 27.38. What are the values of x and y ?

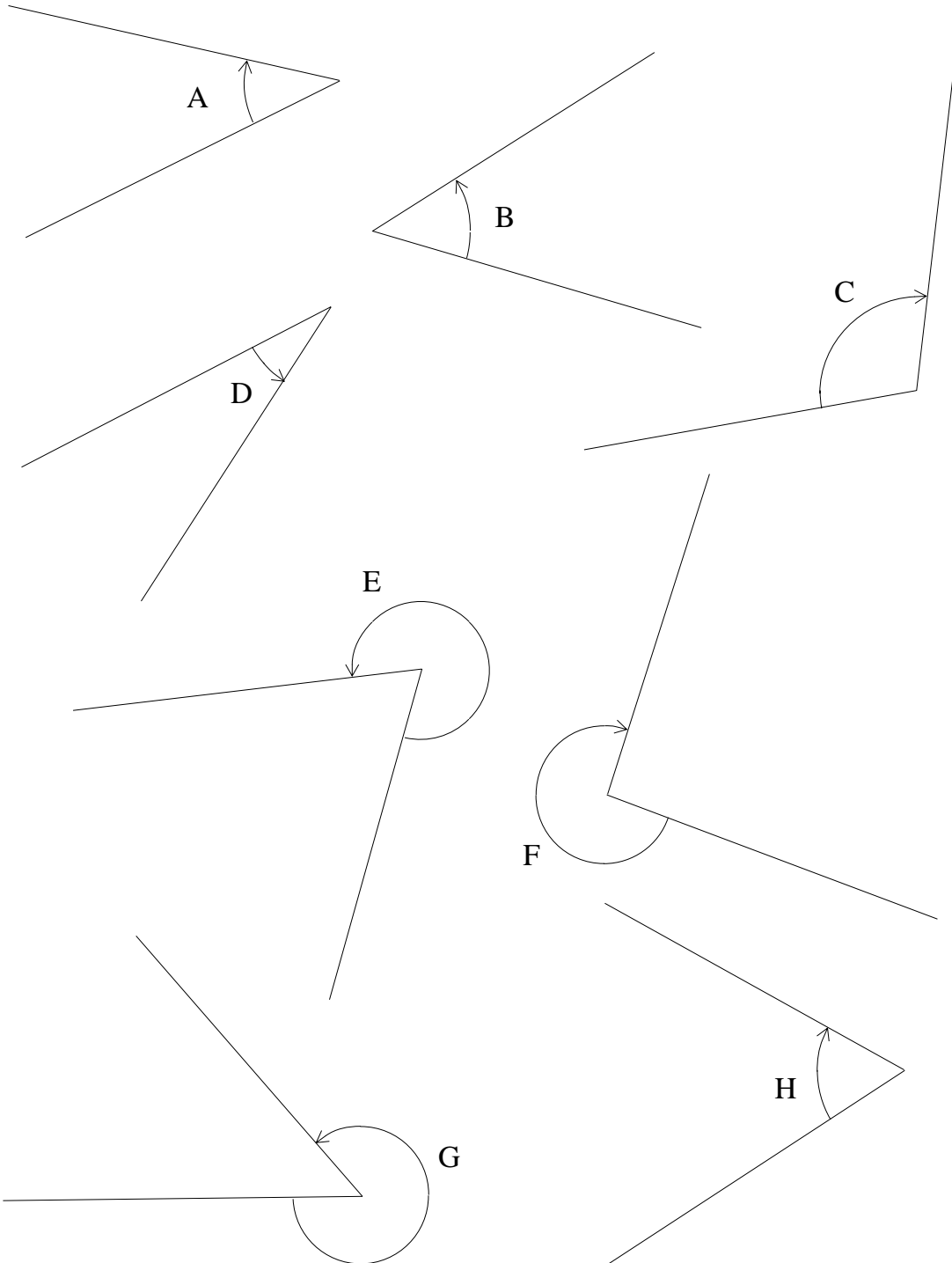
5) x , y and z are three numbers. The value of y is twice that of x . The value of z is twice that of y .

- a) How many times bigger than x is z ?
- b) When added together they make 33.6. What are their values?

Angles

10b

1) Measure each of these angles.



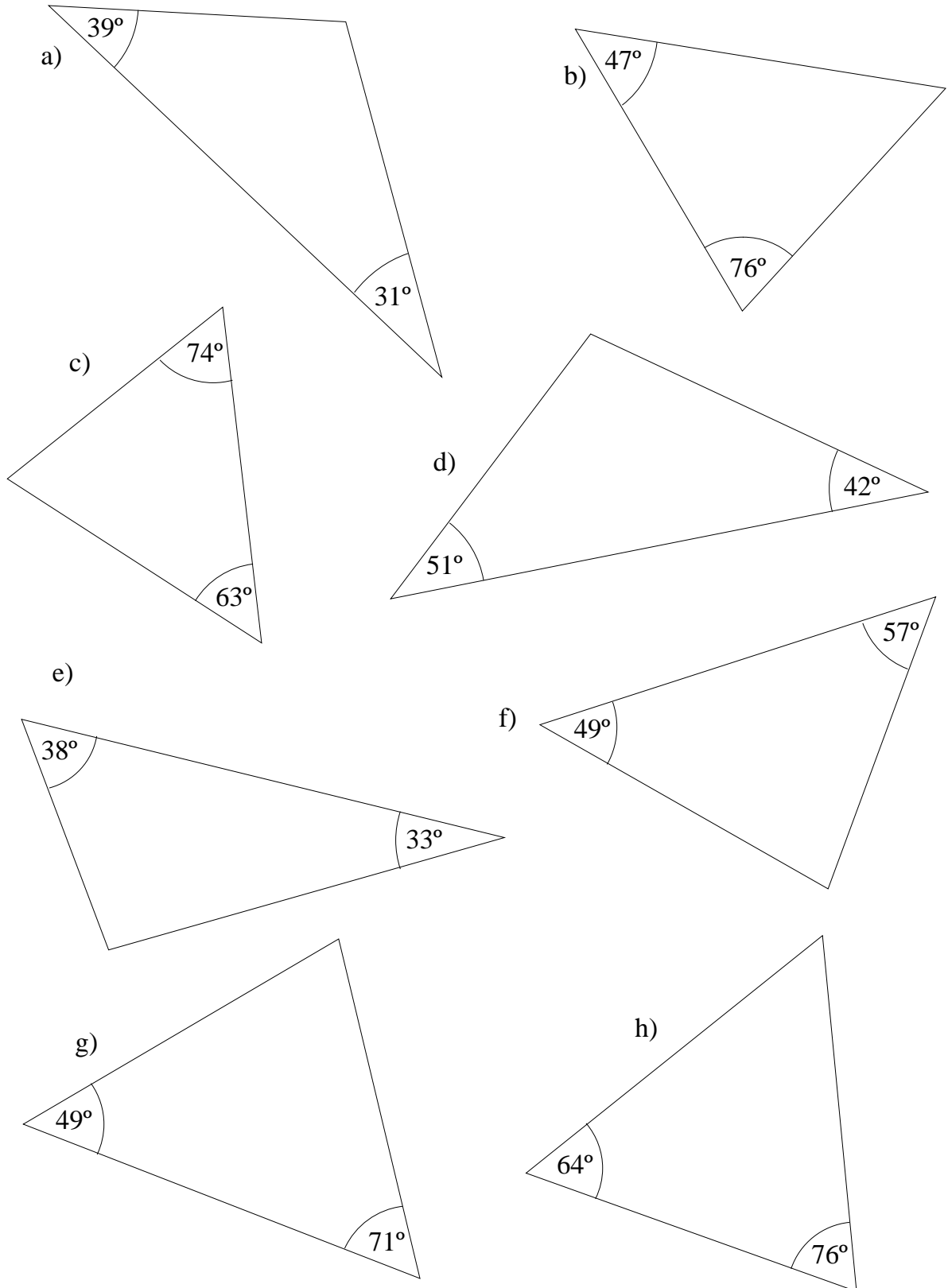
2) Draw these angles

- | | | | | |
|----------------|----------------|----------------|----------------|----------------|
| a) 17° | b) 31° | c) 76° | d) 98° | e) 141° |
| f) 192° | g) 215° | h) 265° | i) 304° | j) 348° |

Triangles

10b

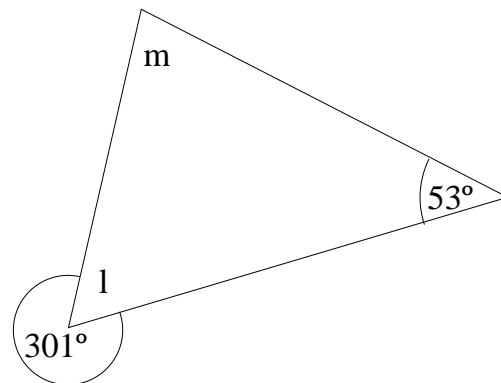
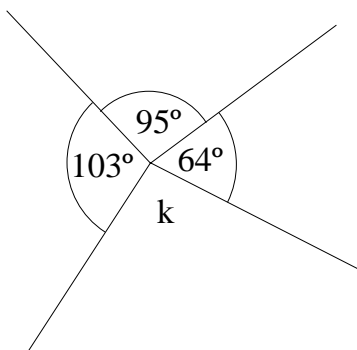
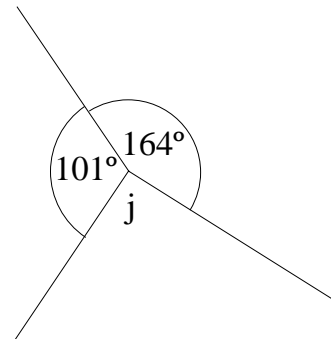
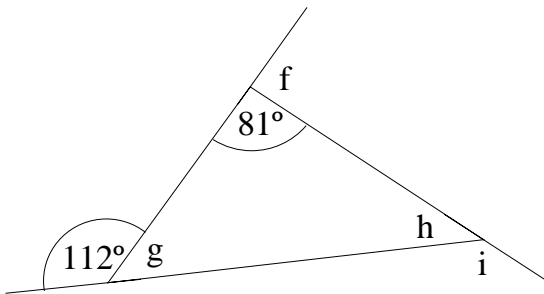
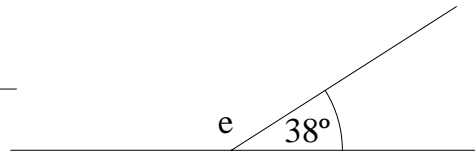
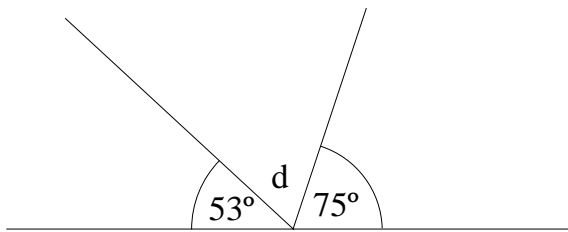
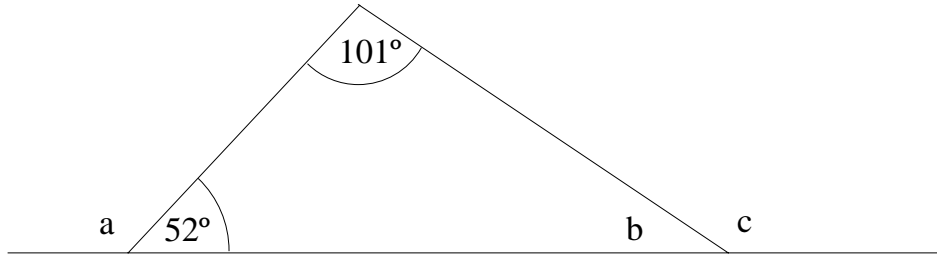
Calculate the size of the missing angle in each of these triangles (angles are not drawn to size).



Angles at a Point

10b

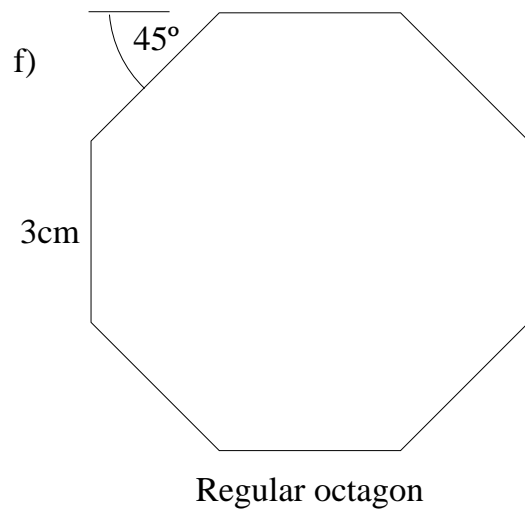
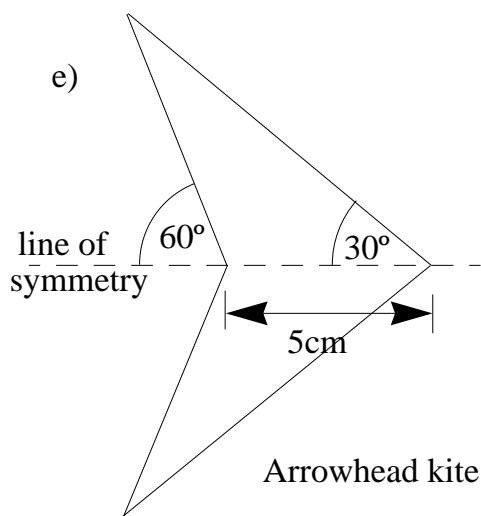
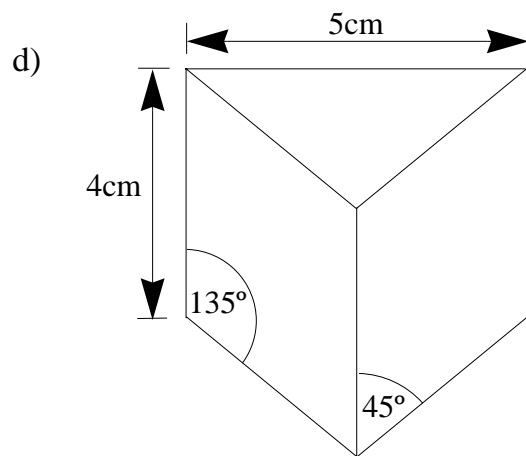
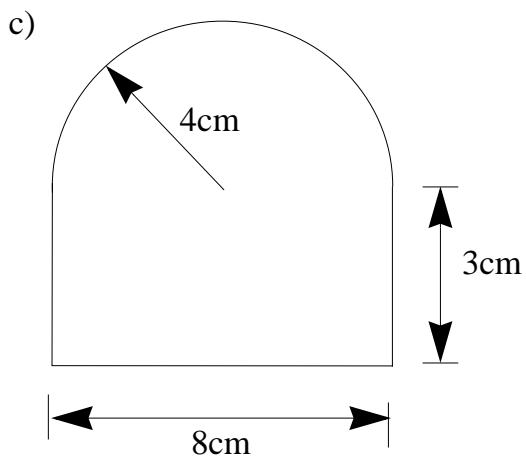
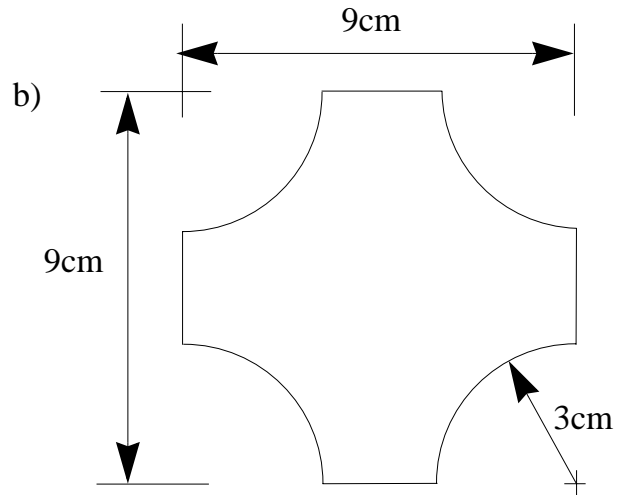
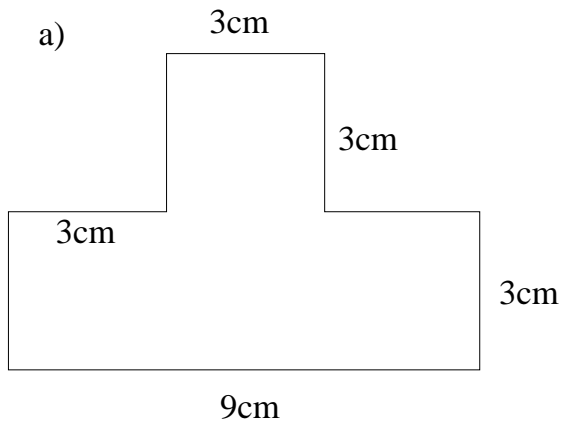
Calculate the sizes of the angles a to m below.



Drawings

10b

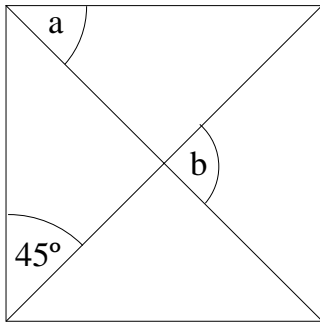
Draw the following shapes full size.



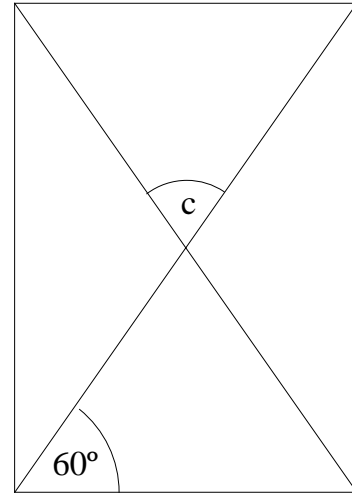
Angles of Quadrilaterals

10b

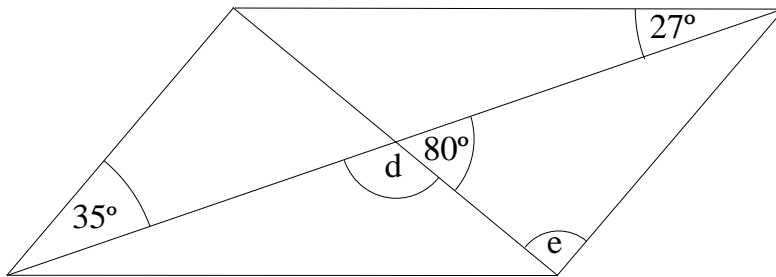
In each of the following shapes calculate the sizes of the unknown angles.



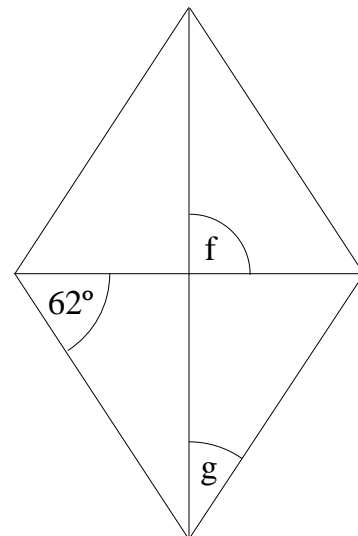
Square



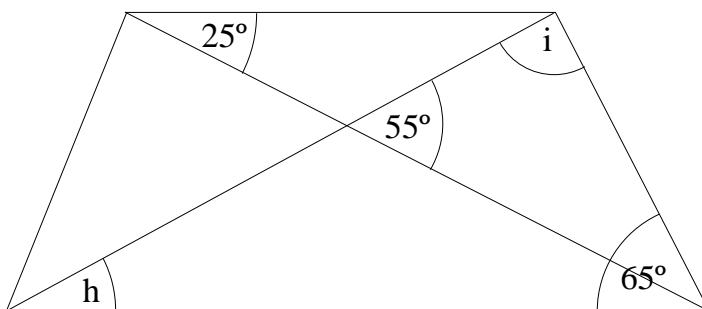
Rectangle



Parallelogram



Rhombus



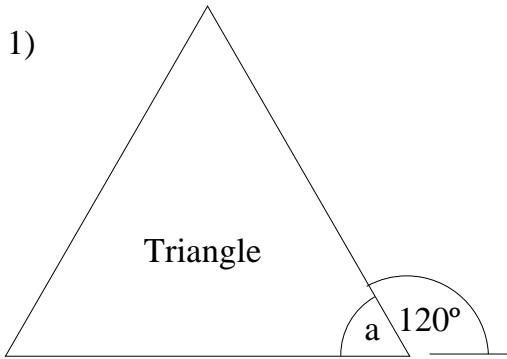
Trapezium

Regular Polygons

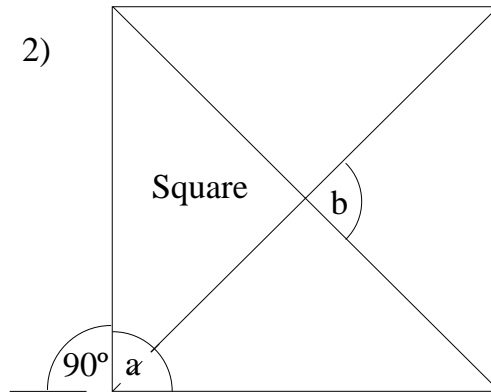
10b

Each of these regular polygons has the exterior angle marked. In each case it is -
 $360^\circ \div$ its number of sides

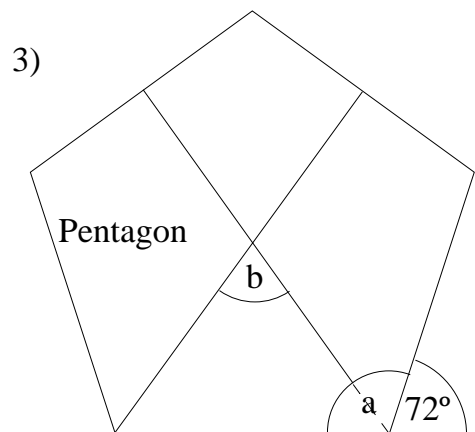
Calculate the interior angle (a) and the angle at the centre (b) in the polygons below.



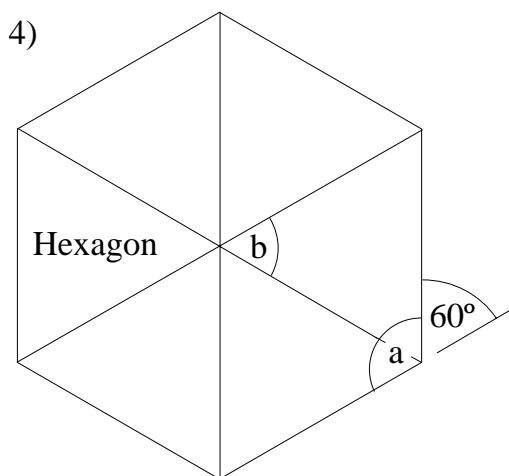
Exterior angle is $360^\circ \div 3 = 120^\circ$



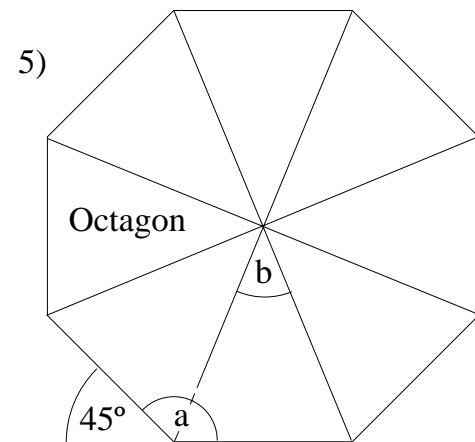
Exterior angle is $360^\circ \div 4 = 90^\circ$



Exterior angle is $360^\circ \div 5 = 72^\circ$



Exterior angle is $360^\circ \div 6 = 60^\circ$

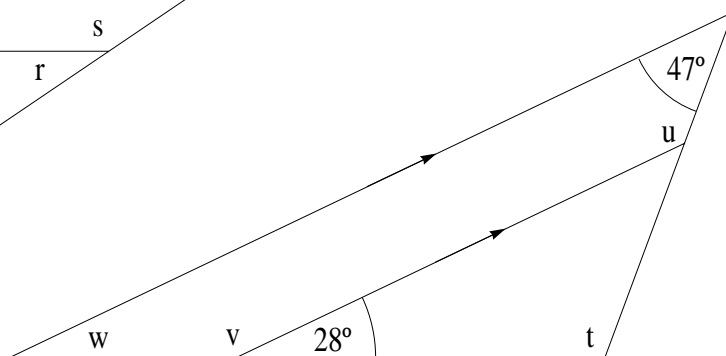
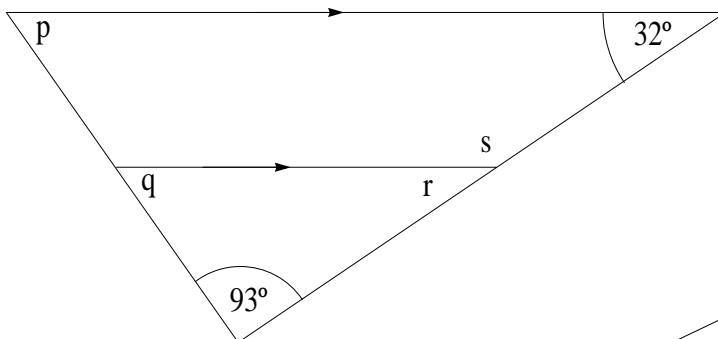
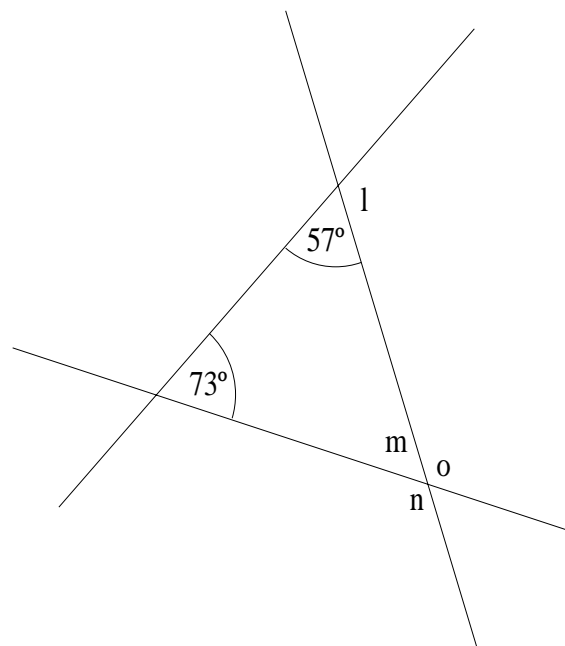
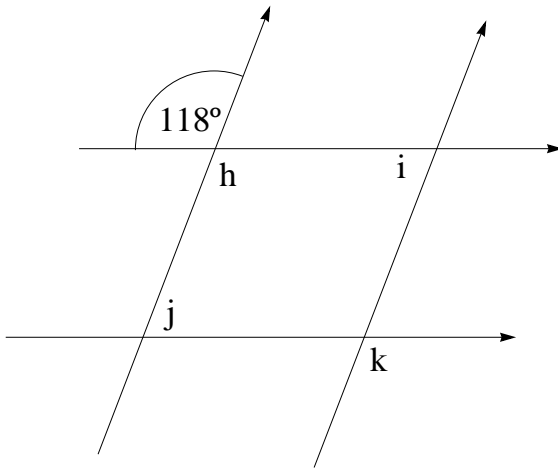
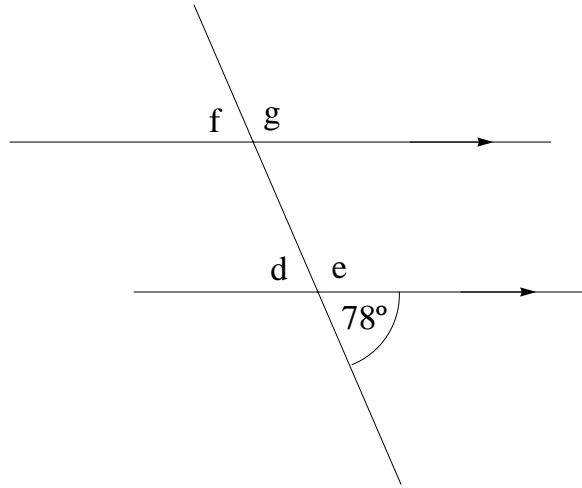
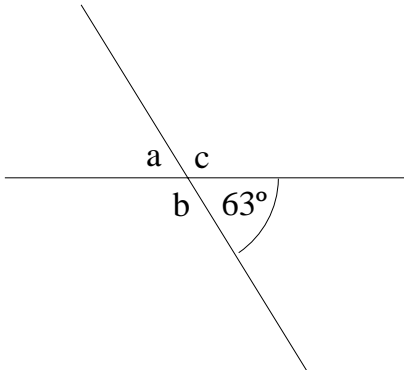


Exterior angle is $360^\circ \div 8 = 45^\circ$

Intersecting and Parallel Lines

10b

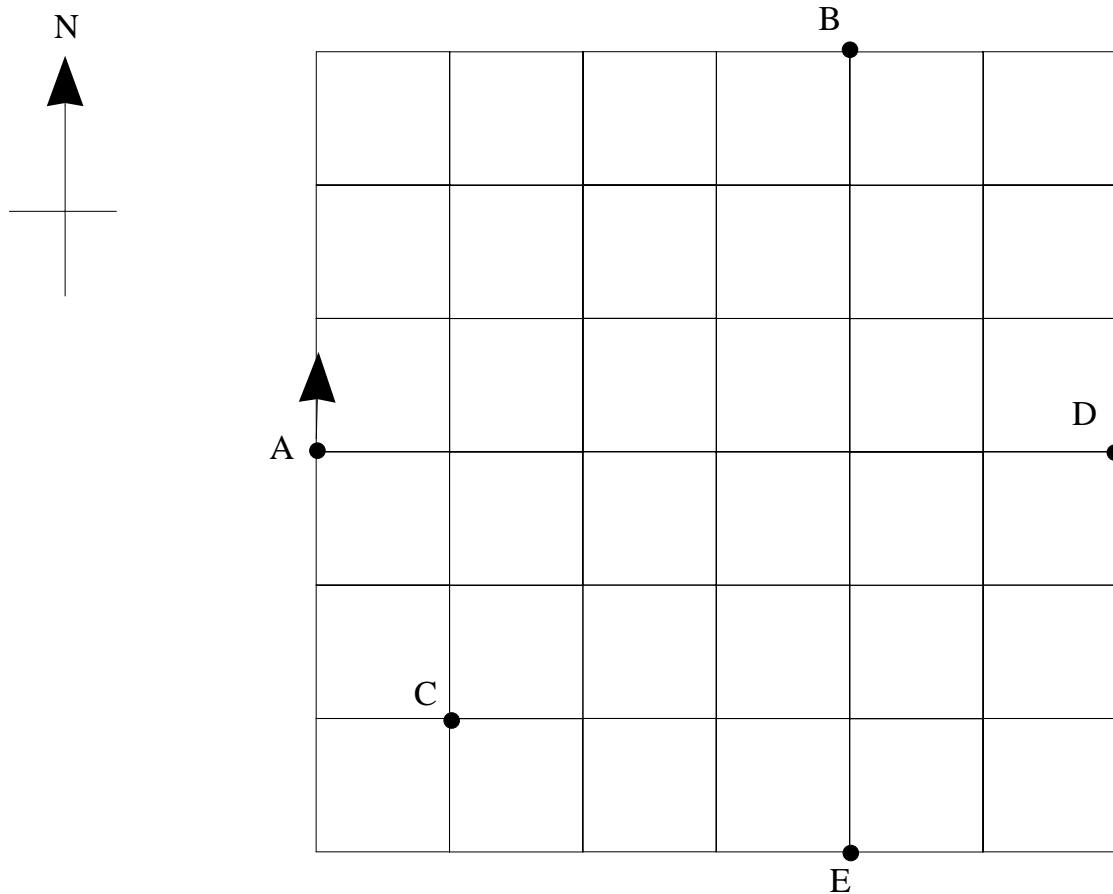
In the questions below calculate the sizes of the marked angles.



Instructions 1

10b

The diagram shows the street layout of a town.
In each question you start pointing north.



The instructions for getting from A to B are:

FORWARD 300
TURN RIGHT 90
FORWARD 400

a) Complete these instructions for getting from A to C:

TURN RIGHT
FORWARD
TURN RIGHT
FORWARD

b) Write instructions for getting from D to E if you begin by pointing north.

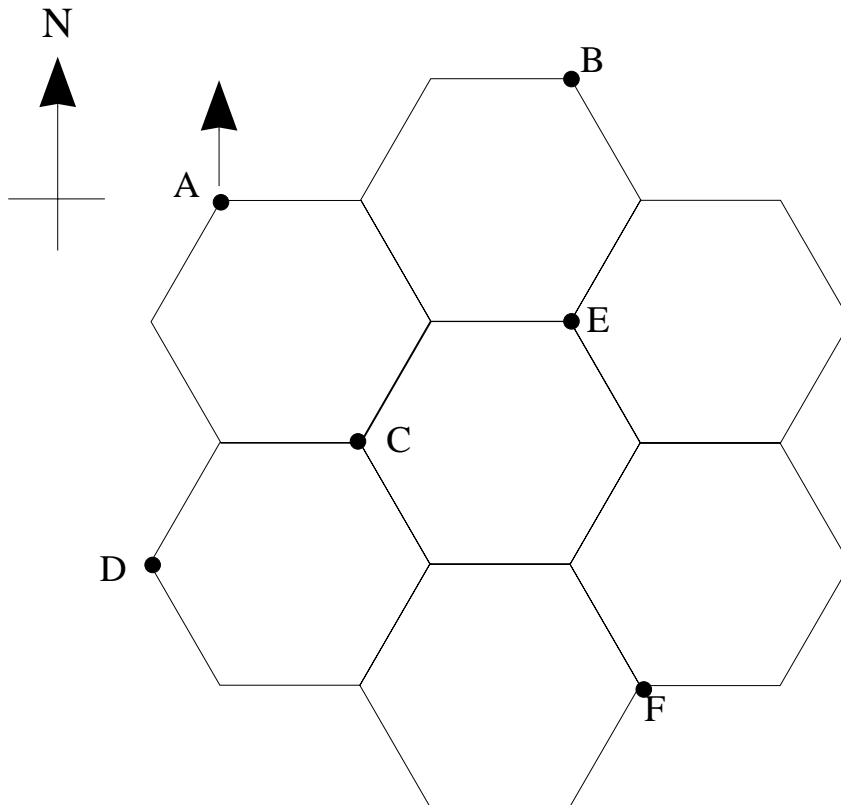
c) Write instructions for getting from A to D then going on to B.

d) Write instructions for beginning at A and visiting each point in alphabetical order.

Instructions 2

10b

The diagram shows the street layout of a town.
In each question you start pointing north.



a) Finish off these instructions for getting from A to B:

TURN RIGHT 90
FORWARD 100
TURN LEFT 60
FORWARD
TURN RIGHT
FORWARD

b) Write instructions for getting from A to C.

c) Write instructions for getting from A to D.

d) You have to go from A to E then on to C.

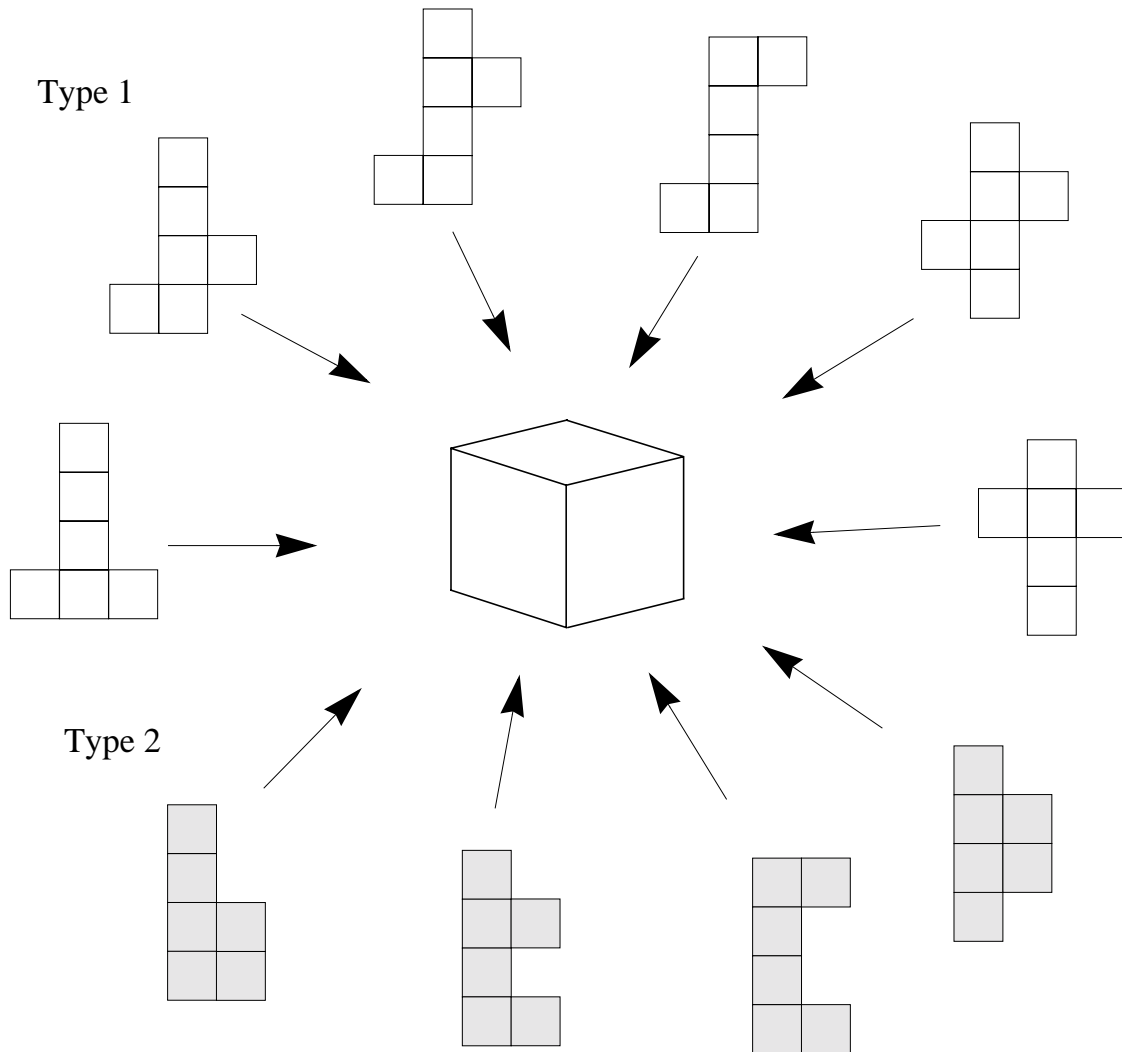
Write down the instructions needed

e) Write down the instructions needed to get from A to F.

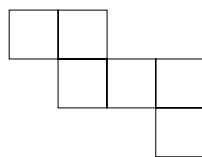
Nets of Cubes

10b

Some of these diagrams are nets of a cube. Some are not.



- Which type are nets and which type are not?
- Describe type 1
- Describe type 2
- Is this the net of a cube?

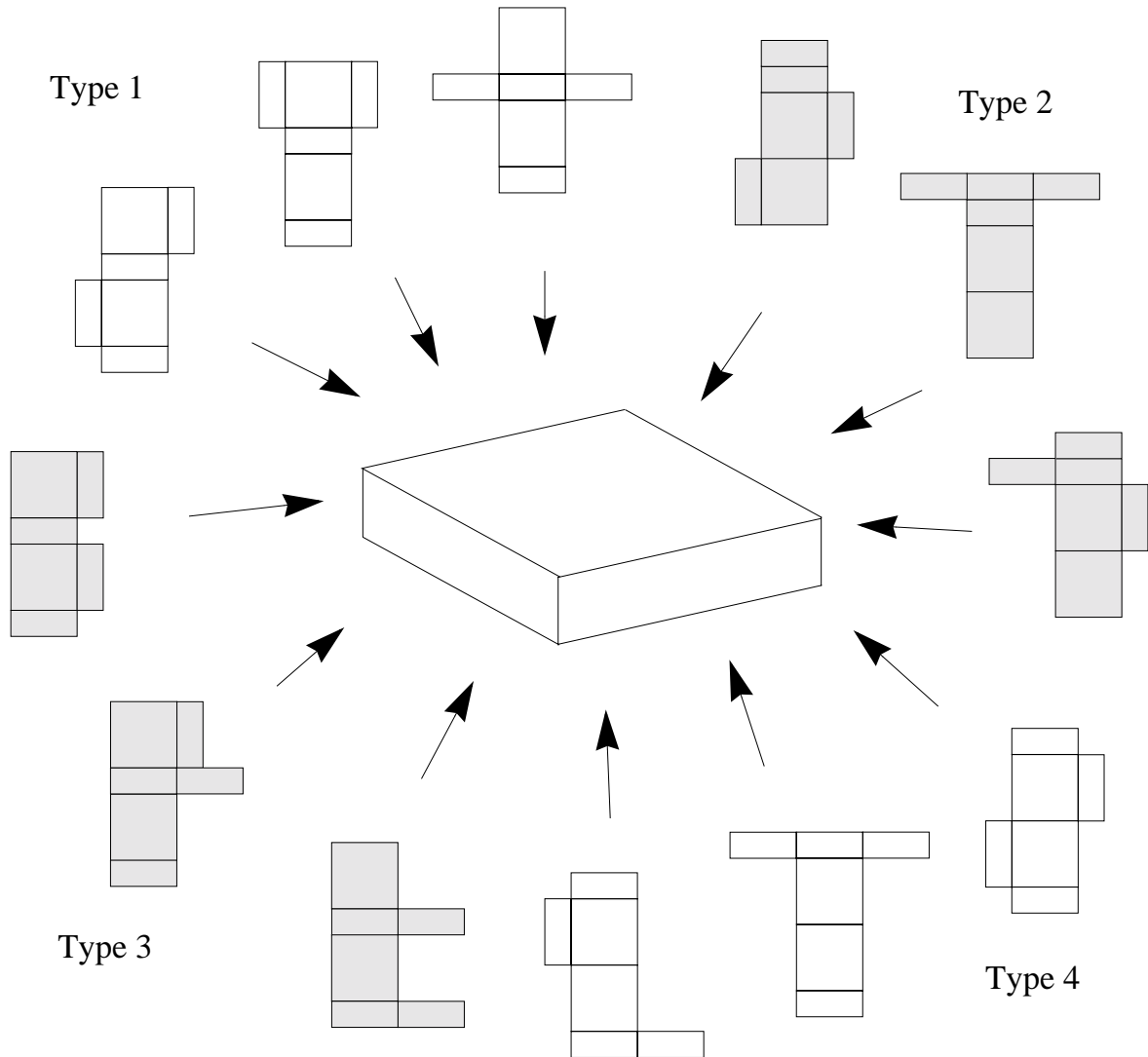


Can you find any more ways of putting six squares together? Are any of them nets of cubes?

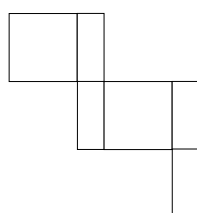
Nets of Cuboids

10b

Some of these diagrams are nets of a cuboid. Some are not.



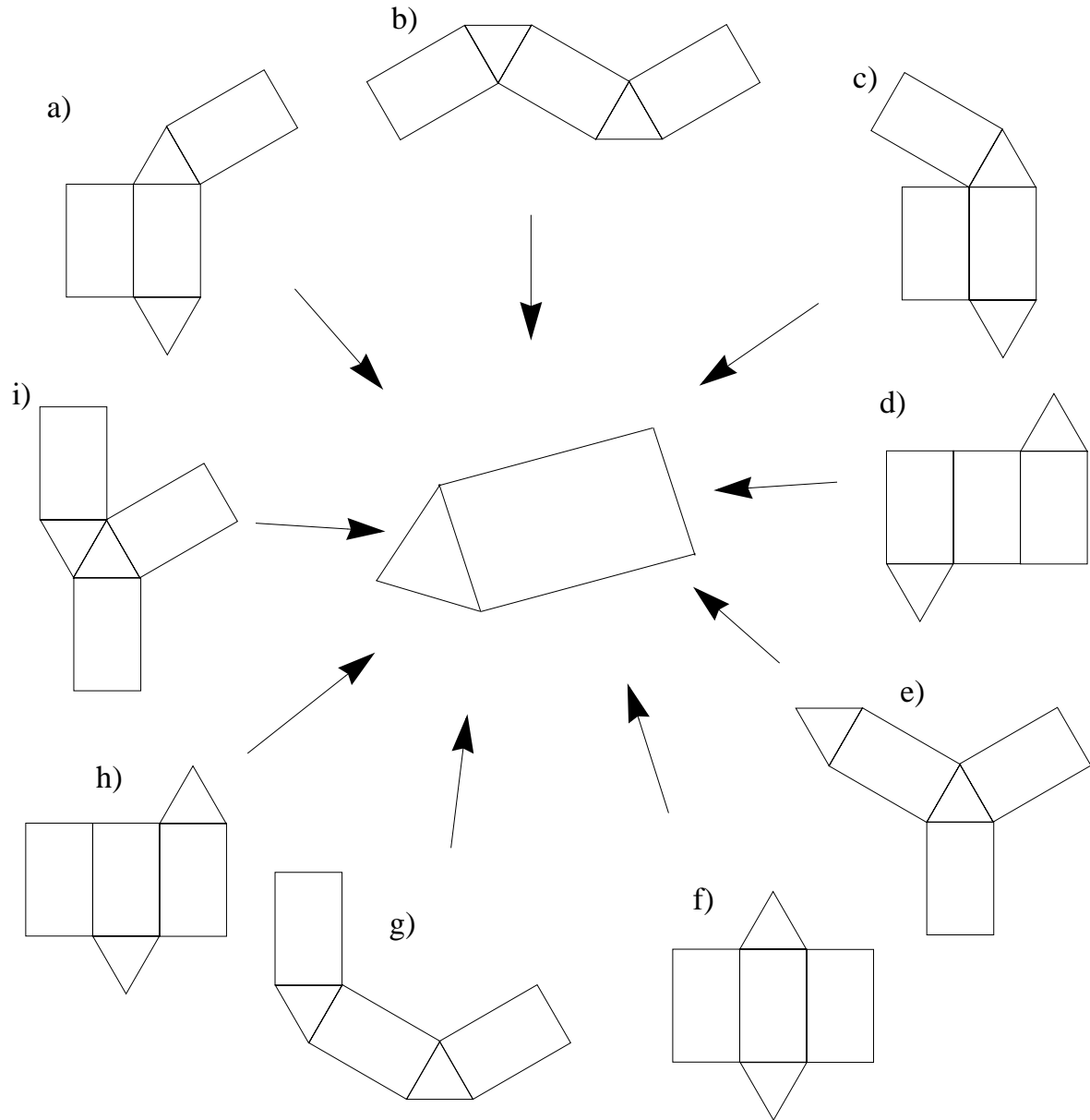
- Which type are nets and which type are not?
- Describe type 1
- Describe type 2
- Describe type 3
- Describe type 4
- Is this a net of this cuboid?



Nets of Triangular Prisms

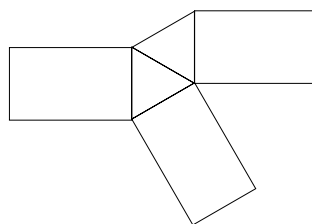
10b

The diagrams represent nets of triangular prisms. The triangle is regular.



Which of the diagrams are true nets?

This shape is not the net of a triangular prism. However by cutting it once it can be made



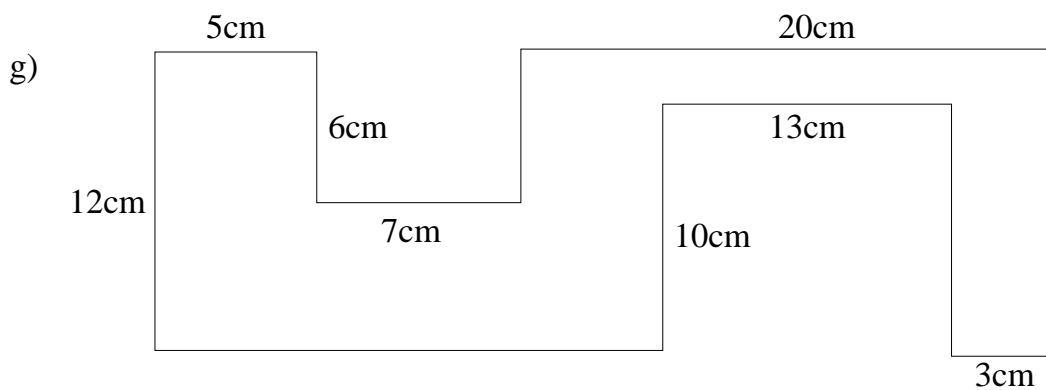
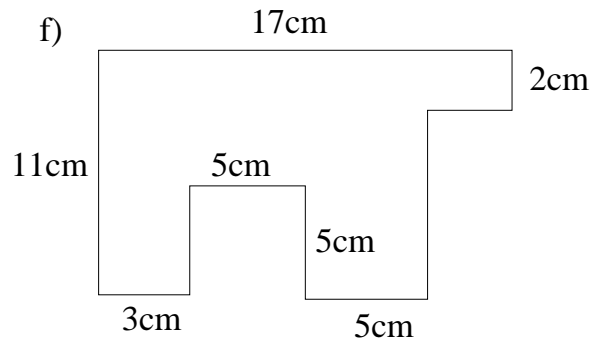
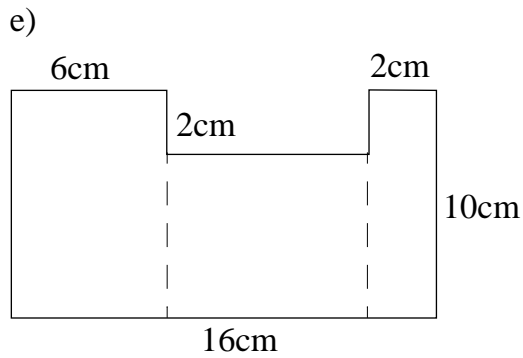
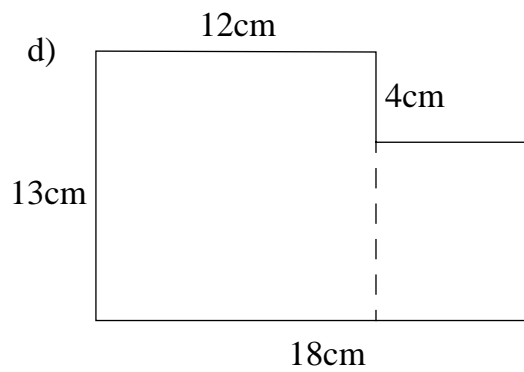
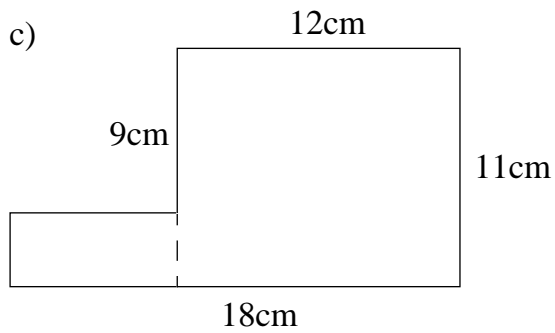
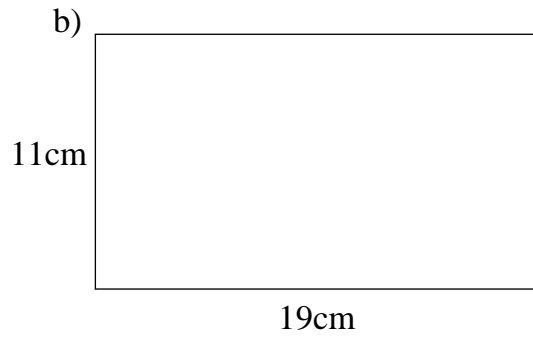
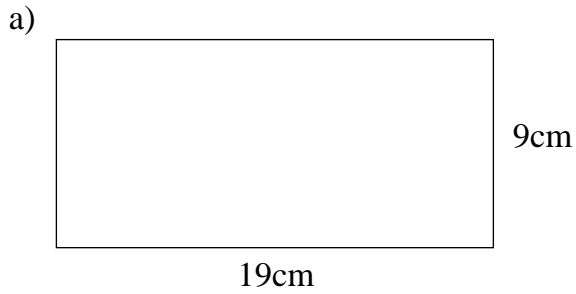
into one. Show where it has to be cut.

Area and Perimeter 1

Do not use a calculator

10b

Calculate the area and perimeter of these shapes.



Area and Perimeter 2

Do not use a calculator

10b

- 1) Square wall tiles measure 10cm by 10cm.
 - a) Tiles are put next to each other for a length of 5 metres. How many are needed?
 - b) How many are needed to cover an area of 5 square metres?

- 2) The driveway to a house has to be re-surfaced. The cost is £84 per square metre.
What is the cost for a drive measuring 9 metres by 4 metres?

- 3) A field is in the shape of a rectangle. It measures 106 metres by 167 metres.
 - a) What is its area in square metres?
 - b) If 10,000 square metres make 1 hectare, what is its area in hectares?

- 4) A room measures 3.5 metres by 4.5 metres. Carpet costs £39 per square metre and underlay costs £5.60 per square metre. Grace covers the floor with underlay first, then carpet on top of it. What is the total cost?

- 5) The outside of a house is to be painted. It is semi-detached so it has 3 outside walls. Two walls are 5 metres high and 8 metres long. The third wall is 5 metres high and 6 metres wide.
 - a) What is the total area of the three walls?
 - b) 1 litre of paint will cover 9 square metres of wall. How many litres of paint will be needed to cover the walls once?
 - c) Paint is sold in 4 litre tins. The wall needs two coats. How many tins will be bought?

- 6) Use a calculator for this question.

Courtney says that the area of an A0 sheet of paper is 1 square metre.
The area of an A1 sheet is half that of an A0 sheet.
The area of an A2 sheet is half that of an A1 sheet.
The area of an A3 sheet is half that of an A2 sheet.
The area of an A4 sheet is half that of an A3 sheet. And so on.

 - a) What fraction of the area of an A0 sheet is the area of an A4 sheet?
 - b) If there are 100cm in 1 metre, how many square centimetres are in a square metre?
 - c) What should the area of an A4 sheet be?
 - d) Measure a sheet of A4 paper to see if this is (approximately) correct.

Missing Blocks

10b

In each of the pair of diagrams below, both shapes are the same but viewed from different directions. The second view has two dark blocks missing. Put in the missing dark blocks.

a) b)

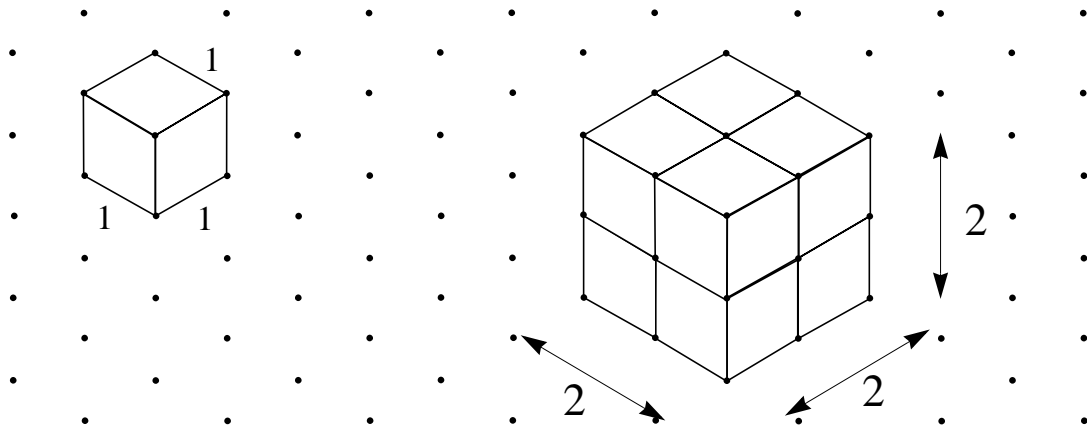
c) d)

e)

Enlargements

10b

The diagram below shows a cube enlarged by a factor of 2

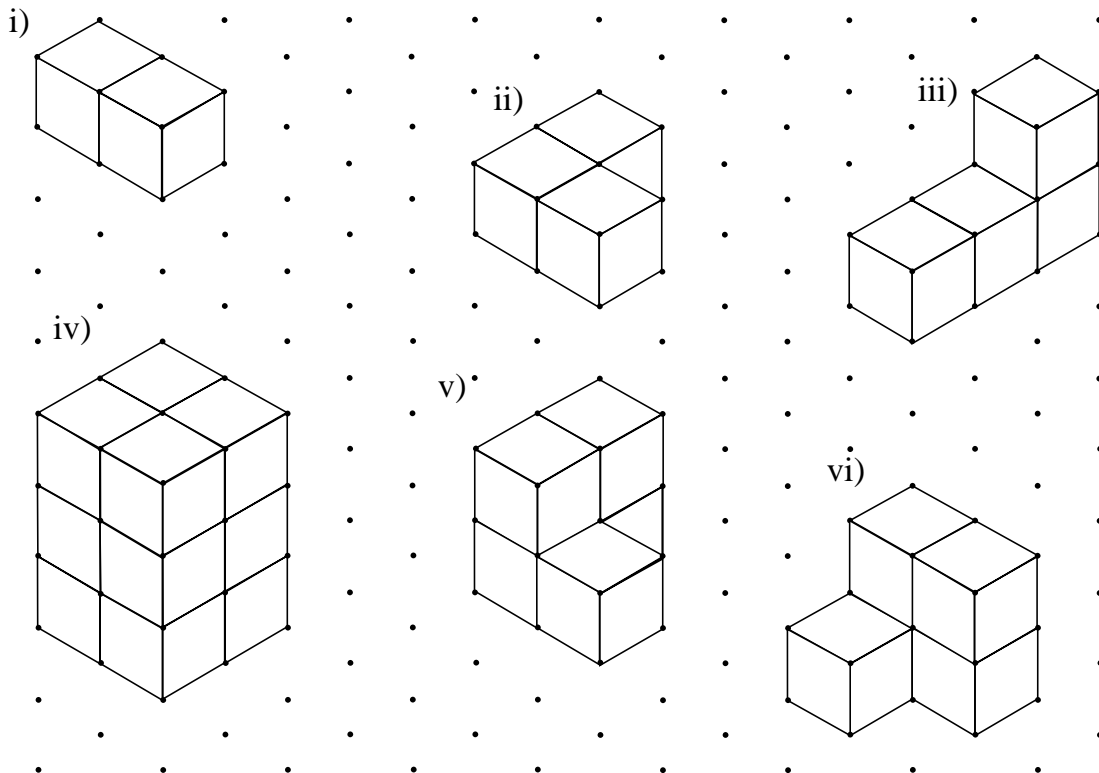


a) How many small cubes are in the larger one?

In the diagrams below, write down -

b) The number of cubes in the shape drawn.

c) The number of cubes when it is enlarged with a scale factor of 2



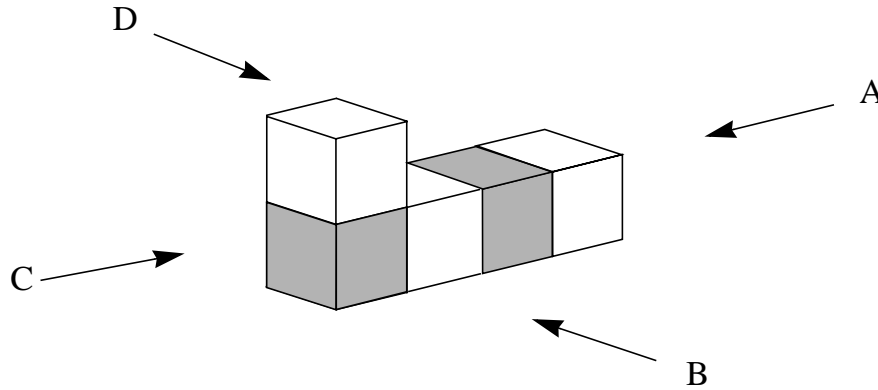
d) A shape is enlarged with a scale factor of 3. How many times bigger than the small shape is the larger shape?

e) Write down the number of cubes in each diagram i) to vi) when enlarged by a factor of 3.

Viewing Shapes

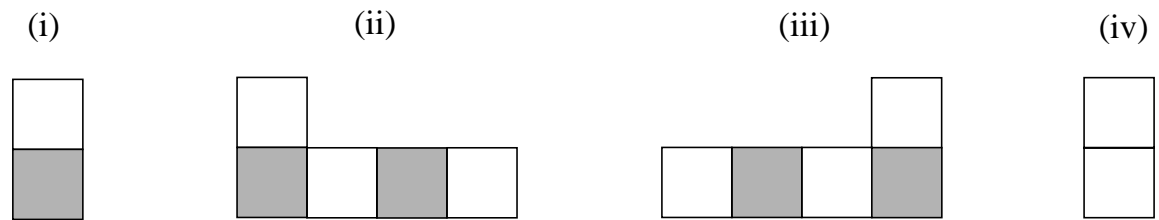
10b

1) The diagram shows a shape made from 3 white and 2 red cubes.



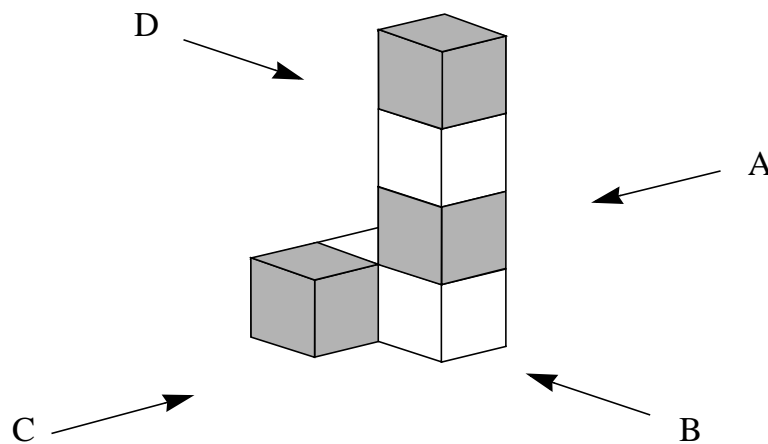
The arrows indicate the direction the shape is viewed from. A is from the right, B is from the front, C is from the left and D is from the back.

a) The diagrams below show these views. Which are which?



b) What would a plan (looking down from above) view look like?

2) This shape is made from 3 red cubes and 3 white cubes.



Draw the views from the directions of the four arrows.

Drawing F's

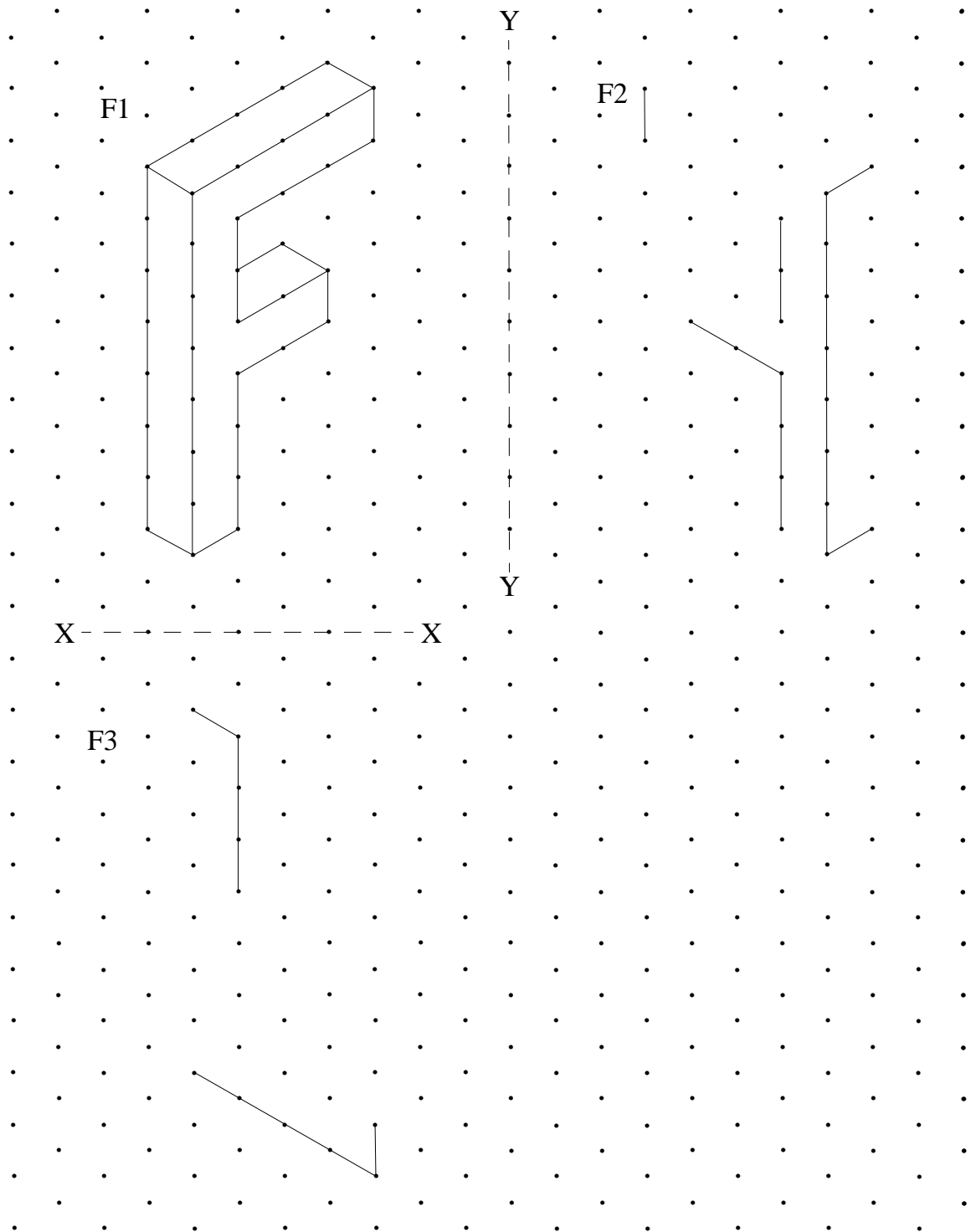
10b

Complete the drawings for these transformations

a) F_1 is reflected across the line Y-Y to make F_2

b) F_1 is reflected across the line X-X to make F_3

Some of the lines have been put in

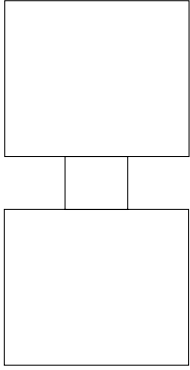


Rotational Symmetry

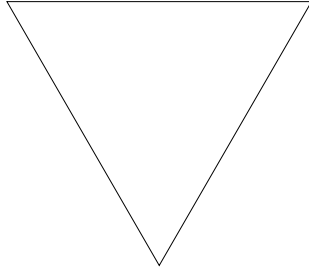
10b

In each of the following diagrams, draw on the lines of symmetry and write down its order of rotational symmetry.

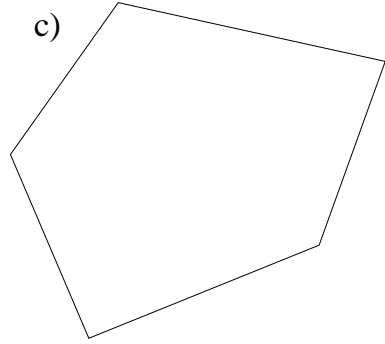
a)



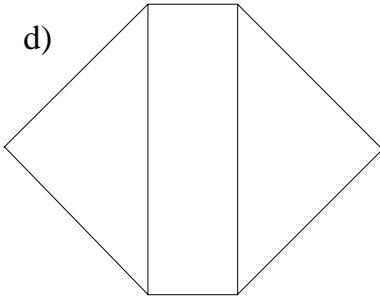
b)



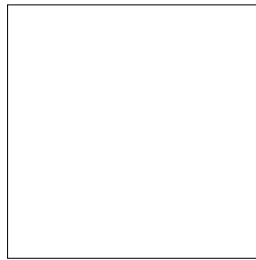
c)



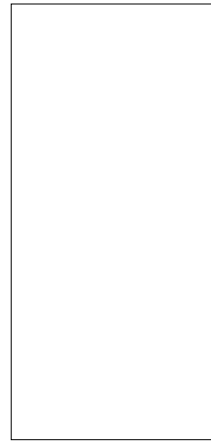
d)



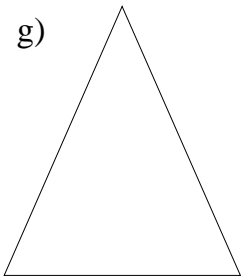
e)



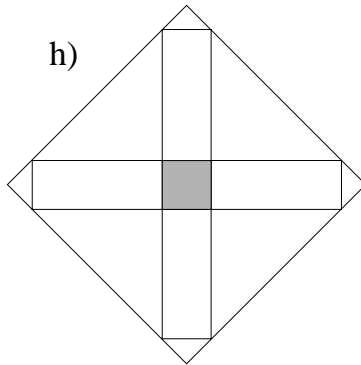
f)



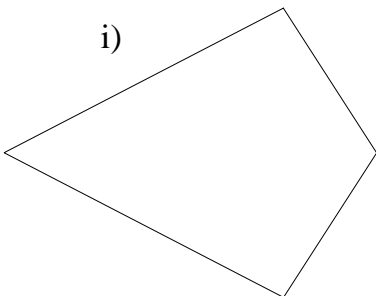
g)



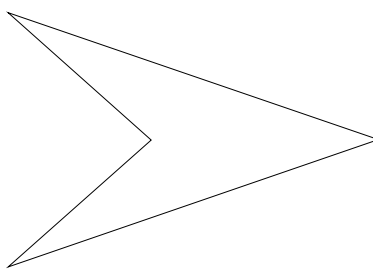
h)



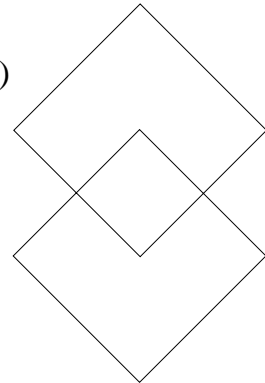
i)



j)



k)



Metric and Imperial Measure

10b

- 1) The distance between Cardiff and Newcastle is 300 miles. What is it in kilometres?
- 2) Milk is sold in 1, 2, and 4 litre containers. Chloe wants to buy 5 pints.
Which two size containers should she buy?
- 3) a) What is the approximate metric equivalent of 1 foot?
b) What is the approximate metric equivalent of 1 inch?
Charles's height is 5ft 7ins.
c) What is the approximate metric equivalent of 5ft 7ins?
- 4) The distance between Cork and Belfast is 263 miles. What is it in kilometres?
- 5) Anna buys 35 litres of petrol. She says that she has approximately 7 gallons.
Thomas buys 40 litres of petrol and says that he has 10 gallons.
a) How many litres of petrol does Anna call a gallon?
b) How many litres of petrol does Thomas call a gallon?
- 6) James makes bread. He uses this recipe from an old cook book.
1 ounce of butter
1 ounce of sugar
1 pound of flour
 $\frac{1}{2}$ oz. of salt
 $\frac{1}{2}$ pint of water
He needs to change these units into metric as he only has metric scales.
What measurements will he use?
- 7) Ella weighs 8 stone 9 pounds. She converts this into metric and gets 60.5kg.
a) How many pounds does she say makes 1 kilogram?
She decides to be more accurate. This time she gets an answer of 55kg.
b) How many pounds does she say make 1 kilogram this time?
- 8) Harry goes to the supermarket to buy some potatoes for his mum. She says that she wants 9lbs of potatoes. When he gets there he finds that they are sold in bags of $2\frac{1}{2}$ kg, 5kg and 10kg. Which bag should he choose? Show all your calculations.

Estimating Measures

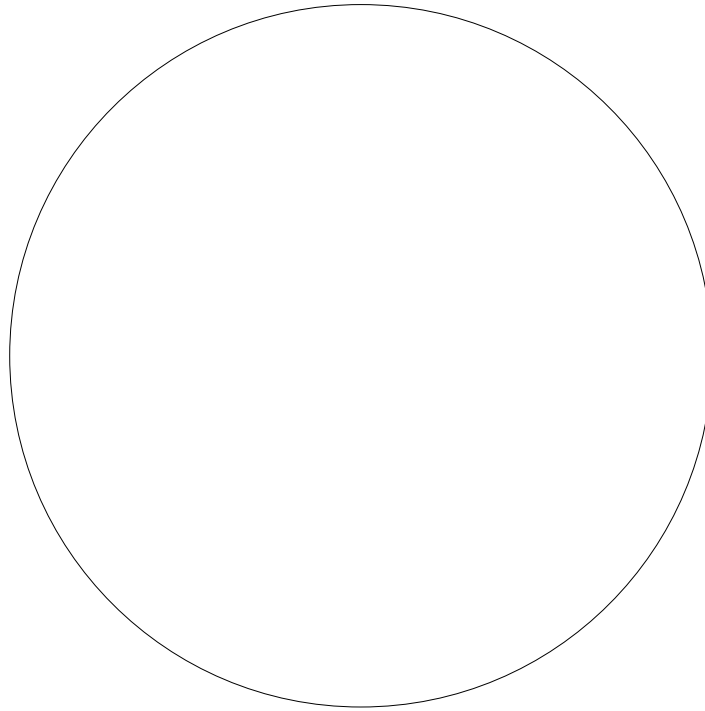
10b

- 1) Complete each of the following statements, putting in an appropriate measurement.
 - a) The distance from Peterborough to Colwyn Bay is approximately 177 ... or 280 ...
 - b) The height of a tree is approximately 10 ...
 - c) Sophie's hand-span is 15 ...
 - d) The length of time the news lasts on TV is 30 ...
 - e) The weight of a tin of tomatoes is 400 ...
 - f) Owen's bath can hold up to 180 ... or 36 ... of water.
 - g) The length of worm is 200 ...
 - h) A computer screen is 17 ... wide.
 - i) The bottle contains 500 ... of orange juice.
- 2) Complete each of the following statements by putting in an approximate value. You are allowed a wide margin, as long as the answer makes sense.
 - a) The height of the house is approximately ... metres.
 - b) A bottle contains about ... millilitres of lemonade.
 - c) A car's petrol tank contains ... litres of petrol when full.
 - d) Tiffany the cat weighs ... kg.
 - e) Mrs. Khan bought a cabbage weighing ... kg.
 - f) Jane lives about 3km from the middle of town. She walks to the library in the centre of town in about ... minutes. She takes the bus home. It takes ... minutes.
 - g) Jane finds the bag of potatoes heavy to carry. It weighs ... kg
 - h) Charles takes 5 minutes to walk to school. The distance he has to go is ... metres.

π

10b

- 1) Below is a circle
- Measure its diameter
 - Now measure its circumference. This is the distance all the way around.
It will be a bit messy to do accurately. Do it a few times and put down which you think is the most accurate.



- Divide the circumference by the diameter. Write down your answer. It should be a bit more than 3.
- Draw two more circles of a different size. Don't make them too small as this makes them more difficult to measure.
- Carry out stages a, b and c for each one. Write down your answer each time.

This value (just a bit bigger than 3) is called 'pi' after the Greek letter π (pi). A Greek letter is used because this was first discovered by the Greeks.

So because

$$\text{circumference} \div \text{diameter} = \pi$$

it can be changed around to calculate the circumference

$$\text{circumference} = \pi \times \text{diameter}$$

So if we measure the diameter (which is easy to do) we can calculate the circumference because it is difficult to measure.

- 2) Calculate the circumference of these circles. Use a value of π that you have calculated.
- diameter of 7cm
 - diameter of 10cm
 - diameter of 13cm

Circumference of a Circle

10b

The circumference of a circle is the distance around it.

The circumference is calculated by multiplying the diameter by π .

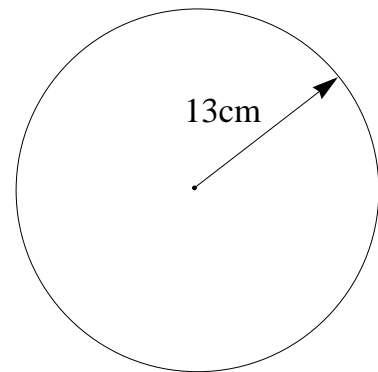
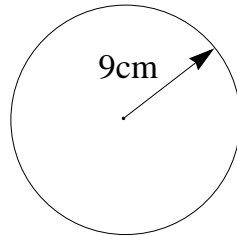
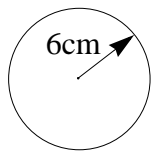
The letter π is from the Greek alphabet and it is pronounced 'pi'.

There is no exact value for π but it is a bit bigger than 3.

This is the formula for calculating the circumference:-

$$C = \pi \times d$$

1) a) What are the diameters of these three circles?

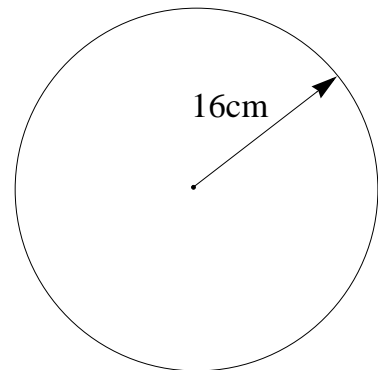
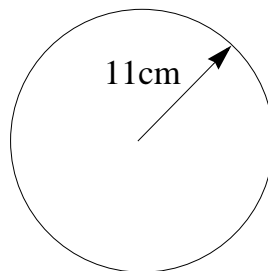
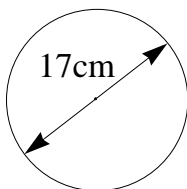


b) Calculate the circumference of these circles. This time let π equal 3

2) To get a more accurate value for the circumference, calculate the values again, this time let $\pi = 3.14$

3) The value for π that is mostly used is $\pi = 3.142$. Calculate the circumferences again using this value.

4) a) Estimate in your head the circumferences of these circles using $\pi = 3$



b) Now work out the circumferences of the circles using $\pi = 3.142$

Area of a Circle

10b

The area of a circle is the space inside it.

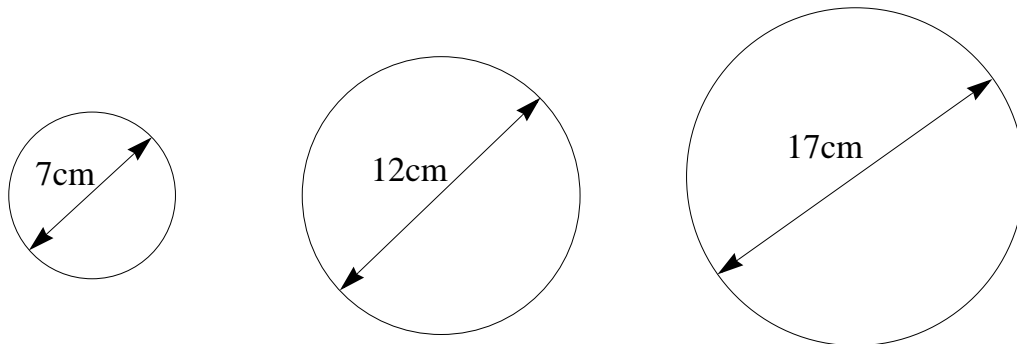
The area is calculated by squaring its radius then multiplying by π .

This is the formula for calculating the area:-

$$A = \pi r^2.$$

To calculate A, always calculate r^2 first then multiply it by π

1) a) What are the radii of these three circles?



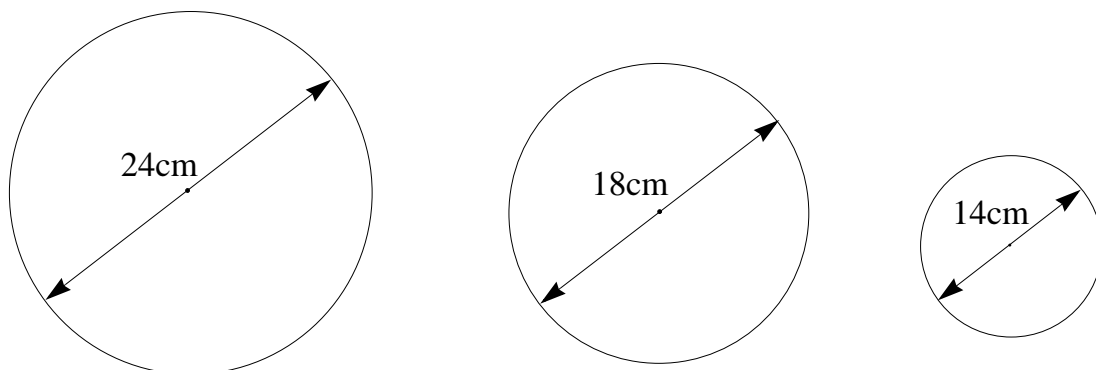
b) Write down r^2 for each of the circles

c) Calculate the area of each circle. Let π equal 3

2) To get a more accurate value of the area, calculate the values again, this time let $\pi = 3.14$

3) The value for π that is mostly used is $\pi = 3.142$. Calculate the areas again using this value.

4) a) Estimate areas of these circles using $\pi = 3$



b) Now work out the circumferences of the circles using $\pi = 3.142$

Circumference and Area of a Circle

10b

In each case use $\pi = 3.142$

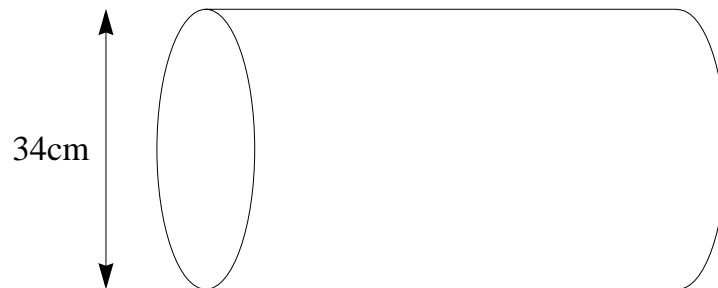
1) A circle has a radius of 150cm.

- What is its diameter?
- What is its circumference?

2) A circle has a diameter of 28cm.

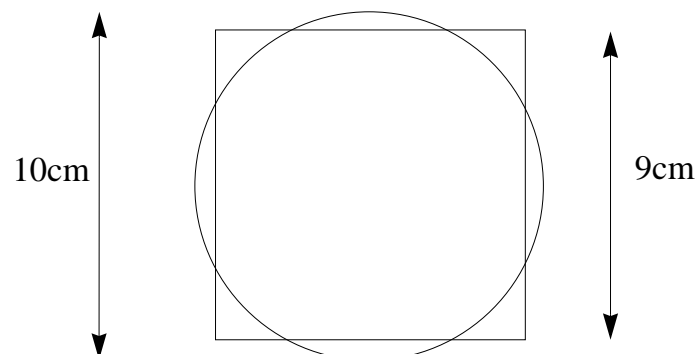
- What is its radius?
- What is its radius squared?
- What is its area?

3) A cylinder has a diameter of 34cm.



- What is its circumference?
- A length of string is wrapped around it 20 times. How long is the string?
- Another piece of string is 1 metre long. How many times can it be wrapped completely around the tube?

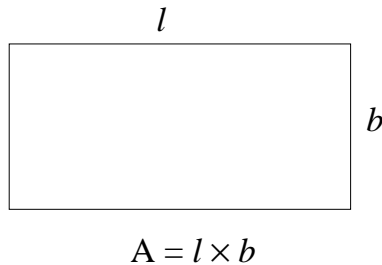
4) Which has the bigger area, a circle with a diameter of 10cm or a square with sides of 9cm?



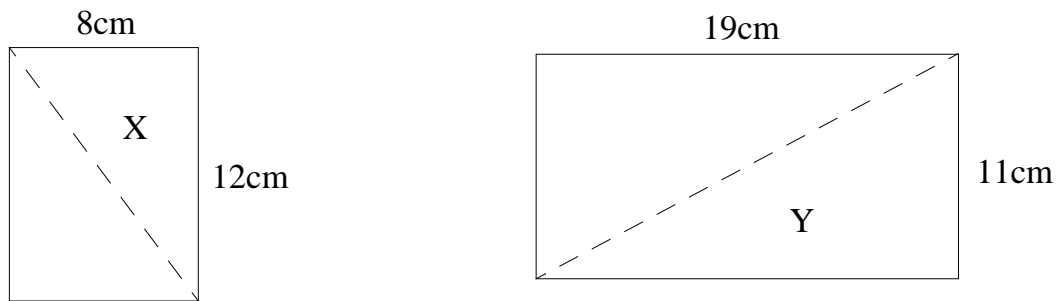
Areas of Rectangles

10b

The area of a rectangle is calculated by multiplying its length by its breadth.

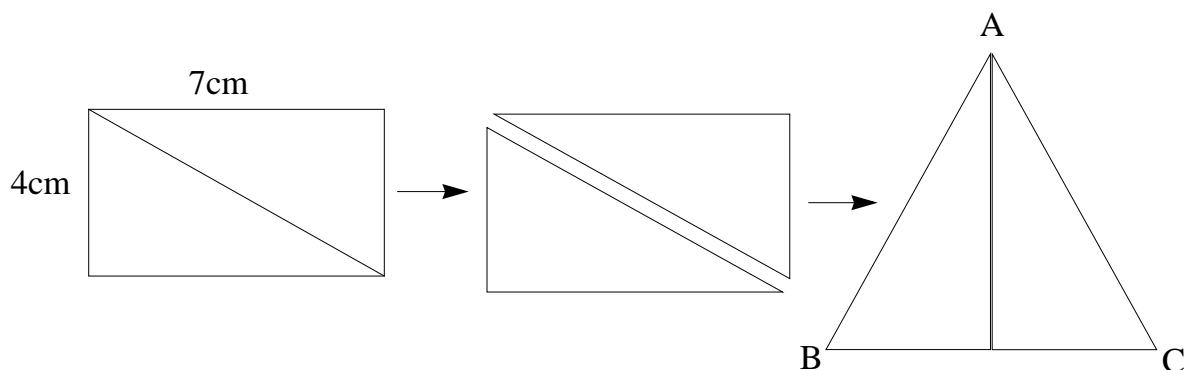


1) These rectangles have been cut with straight lines.



- a) What is the area of triangle X in the first rectangle?
- b) What is the area of triangle Y in the second rectangle?
- c) Say in words how you calculated the area of triangle X.
- d) Each of these will give the area of triangle Y. Write down another way.
 - i) Half the area of the rectangle.
 - ii) Half the height multiplied by the base.
 - iii) The base multiplied by the height then halved.

2) Triangle ABC is made from two halves of a rectangle.



- a) What type of triangle is it?
- b) What is the area of the triangle?
- c) Finish off this formula for a triangle with a base length b and a height of h

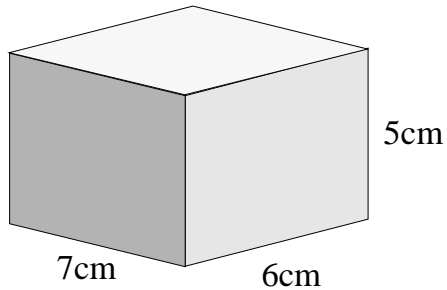
$$A = b \times h$$

Volumes

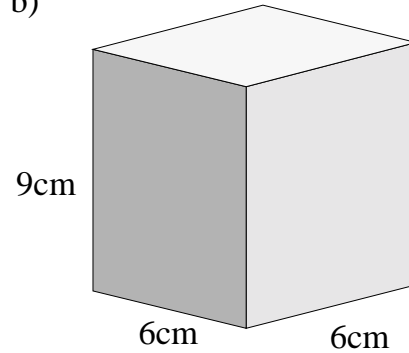
10b.

1) Calculate the volumes of these cuboids.

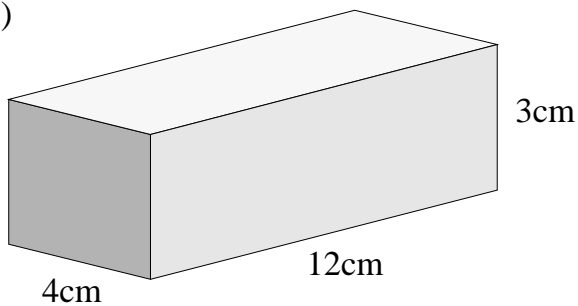
a)



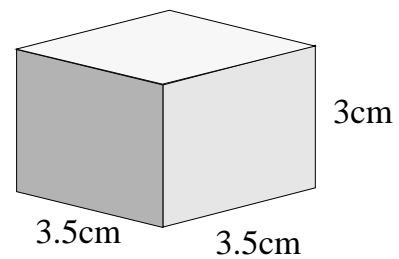
b)



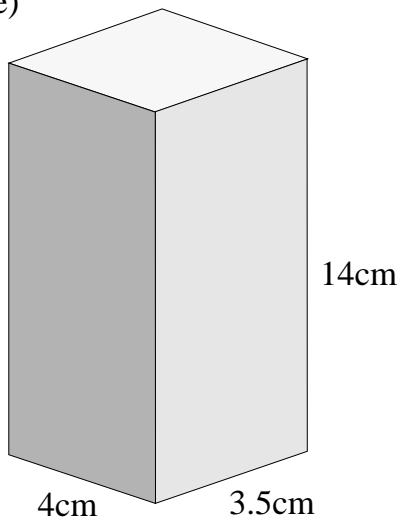
c)



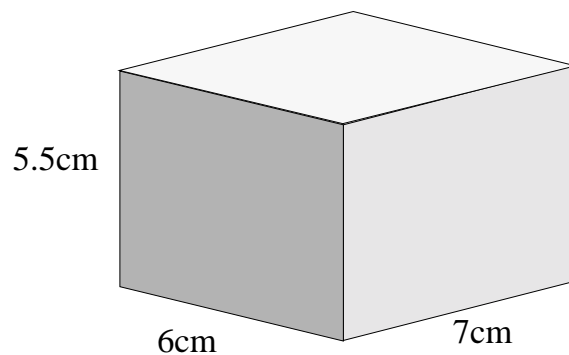
d)



e)



f)



2) a) How many centimetres make 1 metre?

b) How many cubic centimetres are in 1 cubic metre?

c) 1 cubic metre can hold 1000 litres of liquid. How many cubic centimetres will hold 1 litre?

d) A water tank is in the shape of a cuboid. It measures 40cm by 50cm by 35cm. How many litres of water will it hold?

Enlarging Numbers

10b

Enlarge each of the following diagrams by the scale factor given.
Each diagram has been started.

The diagram consists of a large grid divided into three horizontal sections. Each section contains a number on the left, a scale factor and an arrow pointing right in the middle, and a partially drawn enlarged number on the right.

- Top section:** The number '1' is drawn on a 2x2 grid. To its right is a scale factor of $\times 2$ and an arrow pointing right. On the right side of the grid, a vertical line segment is drawn, representing the first step of enlarging the number '1' by a scale factor of 2.
- Middle section:** The number '4' is drawn on a 3x3 grid. To its right is a scale factor of $\times 3$ and an arrow pointing right. On the right side of the grid, a partially drawn shape is shown, representing the first step of enlarging the number '4' by a scale factor of 3.
- Bottom section:** The number '5' is drawn on a 3x3 grid. To its right is a scale factor of $\times 2$ and an arrow pointing right. On the right side of the grid, a partially drawn shape is shown, representing the first step of enlarging the number '5' by a scale factor of 2.

Mean and Range 1

10b

- 1) Calculate the mean and the range of each of these sets of numbers.
 - a) 6, 5, 4, 5, 6, 7, 7, 3, 5, 2
 - b) 5, 8, 6, 8, 10, 9, 10, 7, 8, 9
 - c) 2.4, 4.6, 3.5, 5.7, 4.0, 6.8, 5.7, 7.9, 9.3, 6.7
 - d) 8.8, 6.7, 10.0, 7.8, 6.1, 8.9, 7.8, 5.3, 11.4, 4.5
 - e) 53, 57, 48, 49, 54, 54, 53, 55, 57, 50, 47, 49, 46, 54, 54
 - f) 4.5, 4.9, 4.0, 4.1, 4.6, 4.6, 4.5, 4.7, 4.9, 4.2, 3.9, 4.1, 3.8, 4.6, 4.6

- 2) Rebecca played 8 games in a competition. Her mean score for the 8 games was 5.
 - a) What was her total score for the 8 games?
Her scores had a range of 5
 - b) Explain why one of her scores was not 12.

- 3) The mean of 5 numbers is 2.4.
Four of the numbers are 2.4, 2.6, 2.3, 2.4.
What is the fifth number?

- 4) Jack needs to save £220 over the next 5 weeks.
 - a) He tries to save the same amount each week. How much is this?
 - b) During the first two weeks he saves £40 and £33. How much has he left to save?
 - c) If he saves the same amount in each of the next 3 weeks, how much will it be?

- 5) Four whole numbers have a mean of 6 and a range of 6.
 - a) What is their total?
 - b) Two of the numbers are 7 and 5. What are the other two?

- 6) Five whole numbers have a mean of 4.2 and a range of 2.
 - a) What is their total?
 - b) Three of the numbers are 4, 3 and 5. What are the other two?

- 7) Six whole numbers have a mean of 25.5 and a range of 3.
 - a) What is their total?
 - b) Four of the numbers are 24, 25, 26 and 27. What could the other two be?

Mean and Range 2

10b

Katie has to calculate the mean of these numbers

674, 678, 681, 679, 678

She does it like this:

First she takes 600 from each number to get:

74, 78, 81, 79, 78

Then she finds the mean of these numbers in the usual way, which is 78.

Then she adds the 600 back on to get the mean of the first lot of numbers.

$$78 + 600 = 678$$

Mohammed tries it by taking off 670.

His numbers become

4, 8, 11, 9, 8

The mean of these is 8

So the mean of the original numbers is

$$670 + 8 = 678$$

1) What are the ranges of these sets of numbers?

a) 674, 678, 681, 679, 678

b) 74, 78, 81, 79, 78

c) 4, 8, 11, 9, 8

d) What do you notice about the answers?

2) a) Calculate the mean and range of these numbers

315, 318, 316, 318, 320, 319, 320, 317, 318, 319

b) Calculate their mean and range by subtracting 300 first.

c) Calculate their mean and range by subtracting 310 first.

3) Calculate the mean and range of these sets of numbers.

a) 79, 75, 74, 73, 75, 74, 76, 78, 77, 77, 78, 76

b) 428, 428, 429, 424, 427, 425, 426, 425, 430, 428, 429, 425

c) 3.0, 3.0, 3.1, 2.7, 2.8, 2.7, 2.9, 2.6, 3.2, 2.9, 3.1, 2.8

d) 13.0, 12.6, 12.9, 12.3, 12.7, 12.6, 12.6, 12.6, 13.0

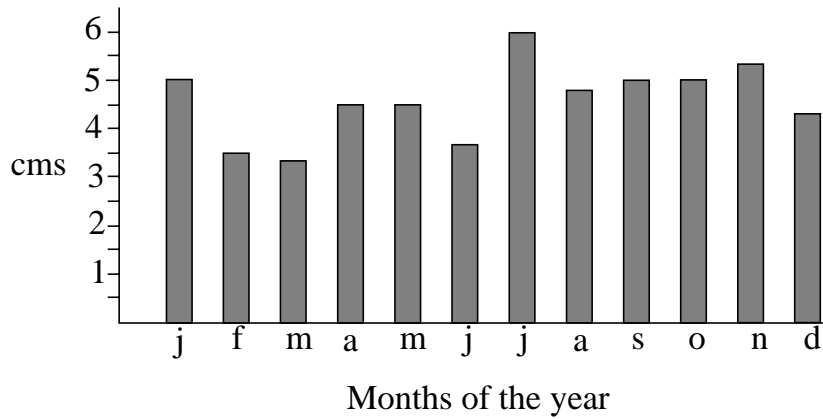
e) 34.7, 34.5, 34.8, 34.4, 34.6, 34.5, 34.6, 34.5, 33.9

Rainfall

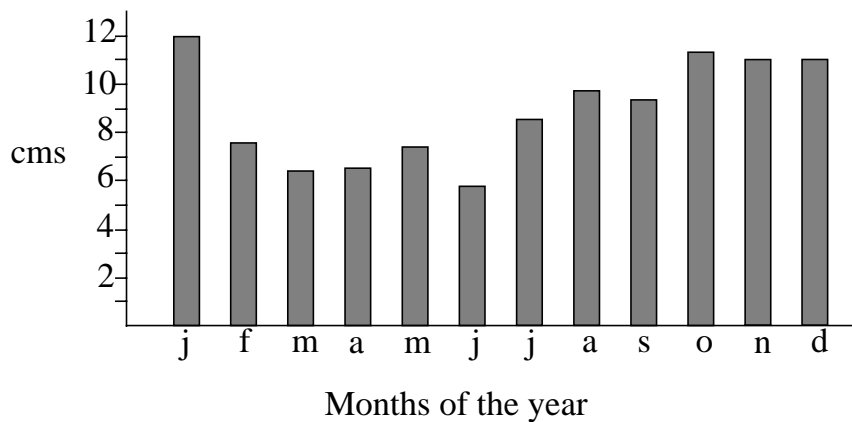
10b

The bar charts below show the annual rainfall for Cambridge and Cardiff.

Annual rainfall of Cambridge



Annual rainfall of Cardiff

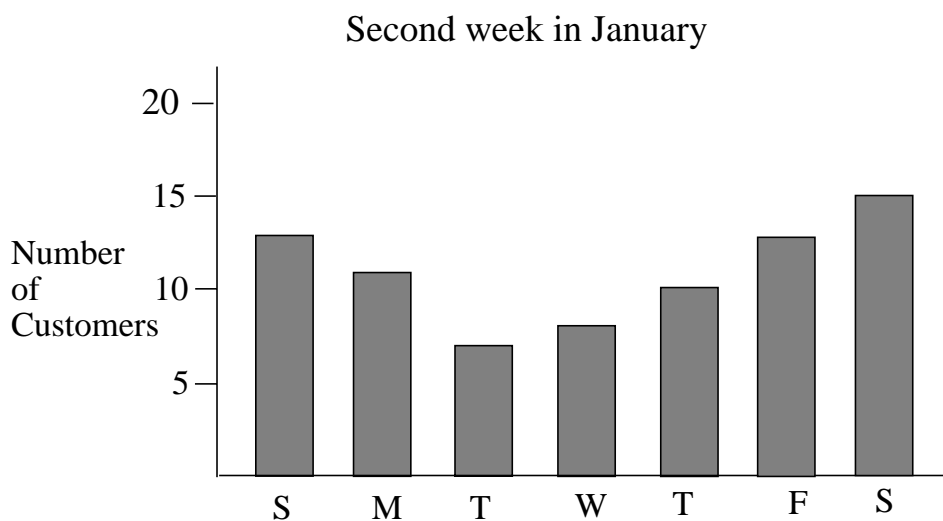
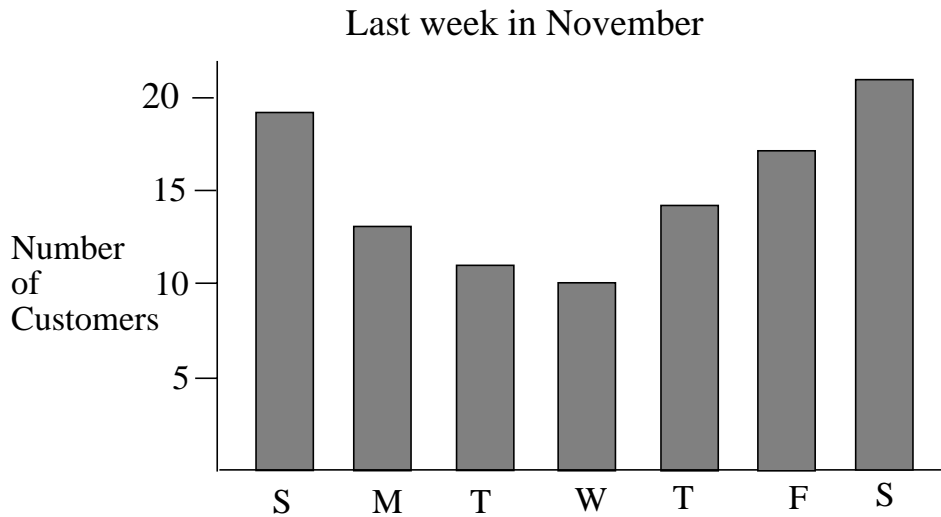


- Which city is the wettest, Cambridge or Cardiff?
- Which month is the wettest in Cambridge?
- Which month is wettest in Cardiff?
- Which city has the highest mean amount of rain per month? How do you know?
- What is the range of the monthly rainfall for the year in Cambridge?
- What part of the year is wettest, Autumn or Spring?
- Which side of the country is the wettest, the west or the east?
- Compare the highest monthly rainfall in Cambridge with the lowest in Cardiff.
What do you see?

Restaurant Customers

10b

The diagrams below show the number of people who visit Hannah's restaurant during two weeks.

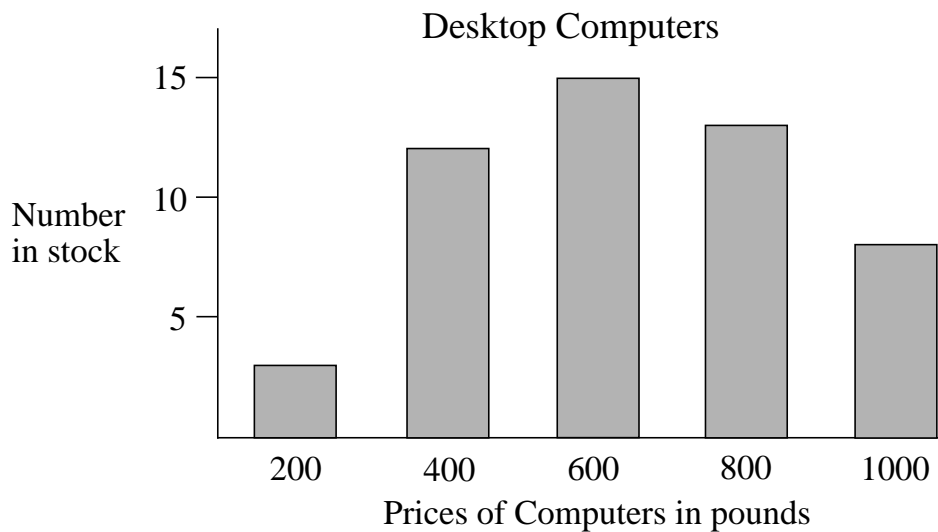
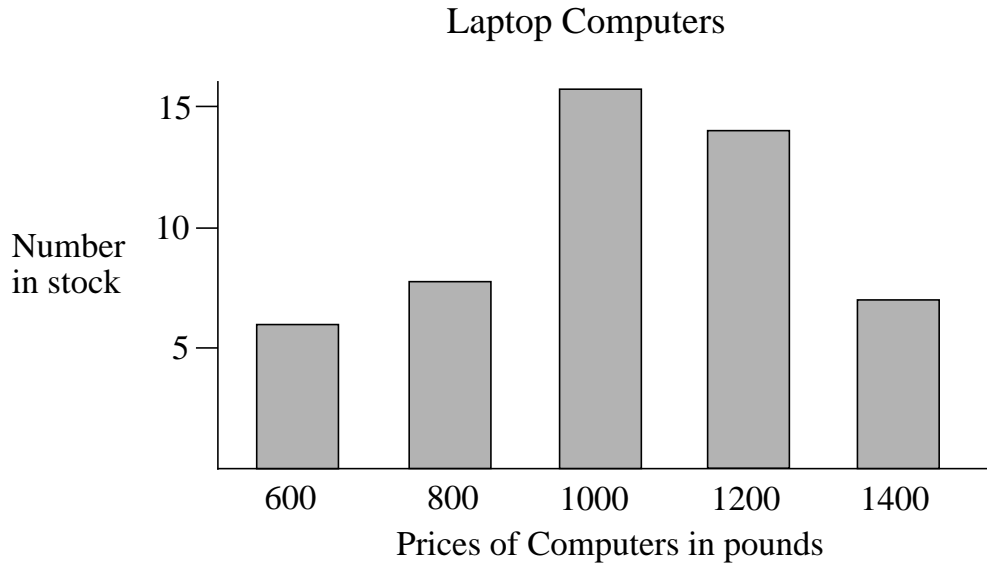


- On which day of the week does she get most customers?
- How many customers went to the restaurant in the last week of November?
- How many customers went to the restaurant in the second week of January?
- What were the mean numbers of customers per night for each of the two weeks?
- When does she get the fewest customers?
- To attract more customers, Hannah sells half price meals on three nights. Which nights do you think she chose?
- She sells these meals in the third week of January. At the end of the week she finds that the total number of customers for the week has risen by just under 30%. How many customers has she had?

Computer Sales

10b

The diagrams below show the number of computers Lauren has in her shop together with their prices.



- How many laptops has she in stock?
- How many desktop computers has she in stock?
- What is the modal price of the laptops?
- What is the modal price of the desktops?
- What is the range of computer prices?
- Calculate the mean price for a laptop.
 - Calculate the mean price of a desktop computer.
- Lauren sells all her stock of £200 computers and gets some laptops which she sells at £1600. What is the new range of computer prices?

Bicycle Prices

10b

Ryan works in a bicycle shop. His manager tells him to do a survey of all the bicycle prices in the shop. He looks at every bike and writes down its price. These were his results.

£121.00 £243.50 £243.50 £197.50 £99.50 £154.00 £213.50 £165.50
 £134.00 £187.00 £214.50 £99.50 £243.50 £135.00 £204.500 £185.00
 £197.50 £135.00 £90.00 £164.50 £184.50 £221.36 £297.50 £164.00
 £234.00 £143.50 £257.50 £185.50 £108.50 £174.00 £165.50 £195.50

He then puts the values into this frequency table.

Price	Tally	Frequency
$50 \leq \text{price} < 100$		
$100 \leq \text{price} < 150$		
	Total	

- a) What does the sign $<$ mean?
 - b) What does the sign \leq mean?
 - c) What does the word frequency mean?
 - d) What does $50 \leq \text{price} < 100$ mean?
 - e) What does \neq mean?
 - f) Copy the table and complete it.
- Use the table to answer these questions:
- g) How many bicycles were in the shop?
 - h) How many bicycles were priced at under £100?
 - i) How many bicycles were priced at over £250?
 - j) How many bicycles were priced between £100 and £150?
 - k) How many bicycles were priced at £150 or above?
 - l) How many bicycles were priced below £150?

Heights of Students

10b

Georgina measures the heights of everyone in a group of 40 students. These were the results to the nearest centimetre.

191	175	169	164	150	185	177	154	157	175
146	159	161	167	162	185	152	193	145	148
173	167	171	179	167	187	144	170	153	163
160	183	181	167	164	173	176	166	157	184

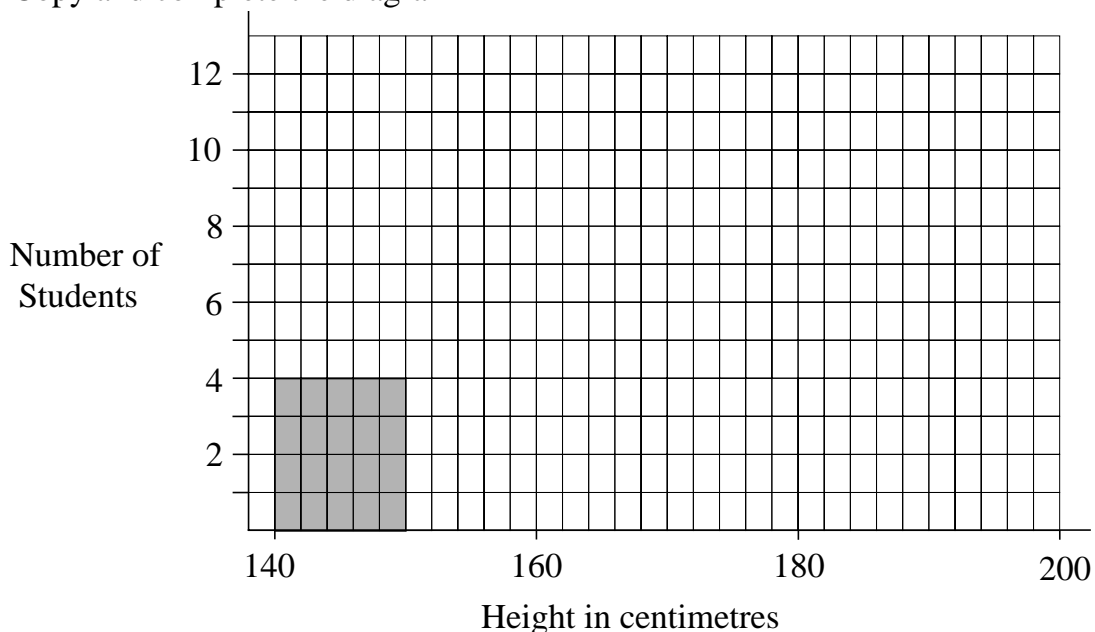
She puts these values into this frequency table.

a) Copy and complete the table.

Height	Tally	Frequency
$140 \leq \text{height} < 150$		
$150 \leq \text{height} < 160$		
	Total	

She then shows this information on the diagram below.

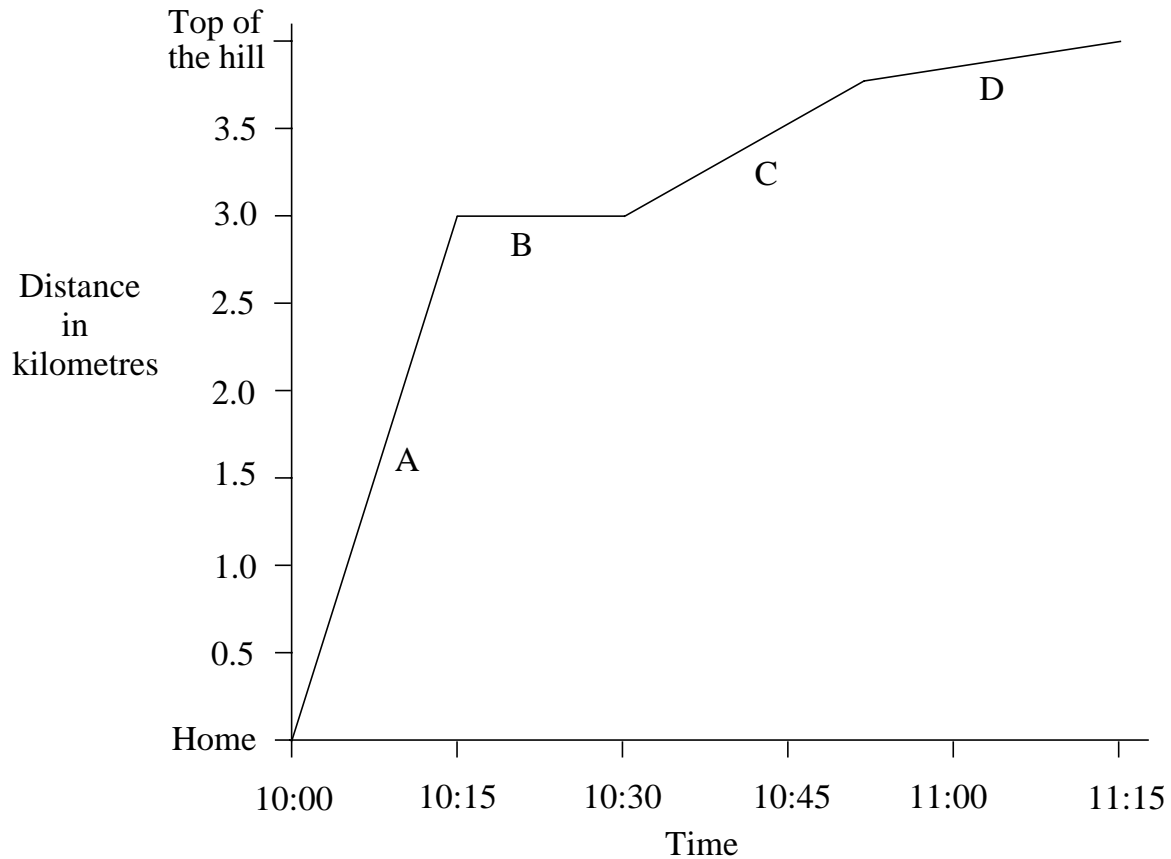
b) Copy and complete the diagram



Travelling

10b

David lives near to a hill. He climbs to its top on foot but travels to the bottom of it on his bike. Here is a diagram showing his journey.

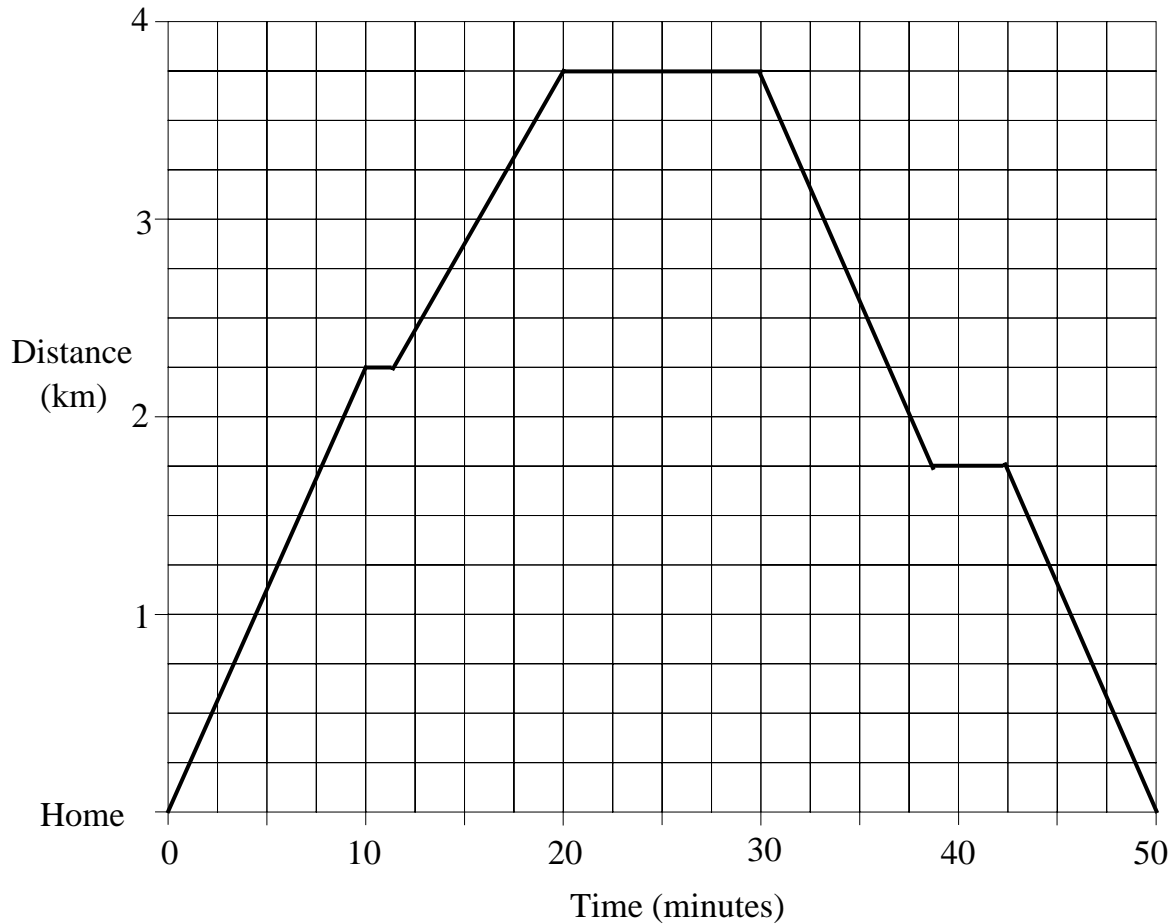


- If he begins his journey at 10:00, at what time does he arrive at the top of the hill?
- How far from home is the bottom of the hill?
- He stops to rest. Which part of the diagram indicates this?
- For how long does he stop?
- Why is part A steeper than the other parts?
- At what time did he arrive at the bottom of the hill?
- At what time does he begin to walk?
- Why do you think part C is steeper than part D?
- At approximately what time does he slow down?
- How long does he spend walking?
- What is the distance from the bottom of the hill to the top?
- How far from his home is the top of the hill?
- Which part of the journey do you think is the most tiring? Explain.

There and Back

10b

Ben rides into town to visit the library then travels home again. The diagram below shows the journey.

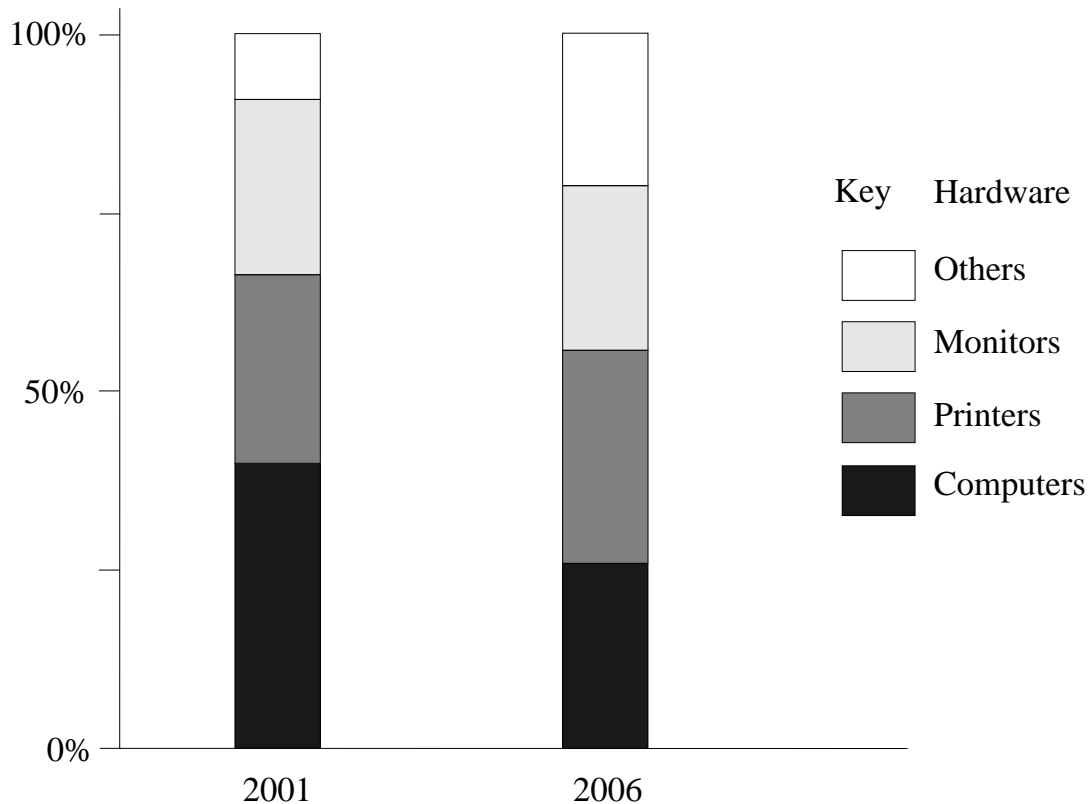


- a) How long did the whole journey take?
- b) How far from home is the library?
- c) On the way to town he stops to post a letter. How long does he stop for?
- d) How far has he travelled when he first stops?
- e) How long does it take him to get to town?
- f) How long does he spend at the library?
- g) On the way home he stops to buy a magazine. How far is he from home?
- h) Over which part of the journey did he ride slowest?
- i) If he arrives back home at 12:45pm, at what time did he leave home?
- j) At what time did he leave the library?
- k) At what time did he stop to post the letter?
- l) What was the total length of his journey?
- m) How far is the magazine shop from the library?

Percentage Bars 1

10b

A computer company sells hardware on the internet from their large warehouse. The bars below indicate the value of the stock they had in September 2001 and September 2006.

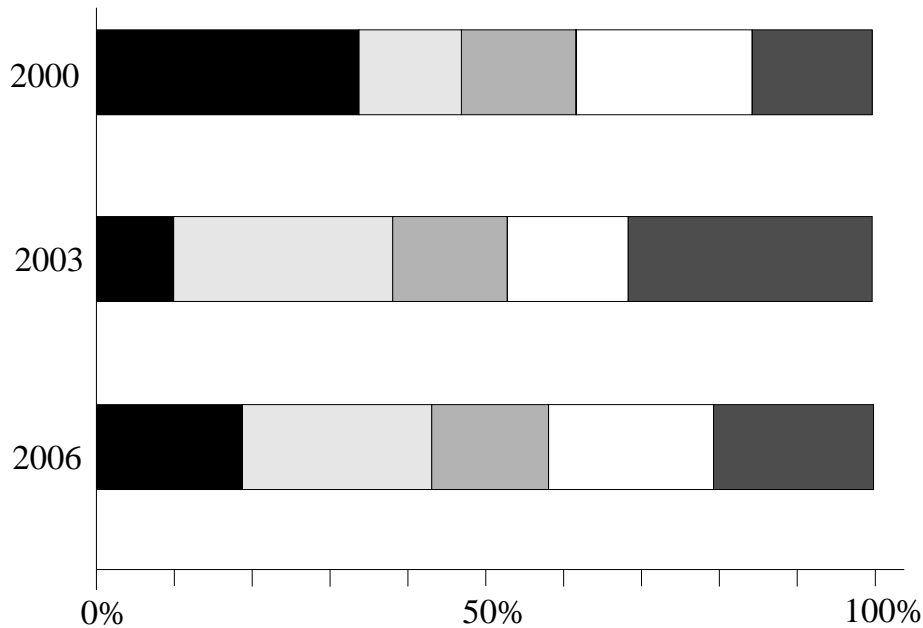


- Which item of stock did they have most of in 2001?
- Which item of stock did they have most of in 2006?
- Which item of stock shows the greatest increase?
- Complete this:- The percentage of 'Other' items rose from ...% in 2001 to ...% in 2006
- What was the percentage share of printers in 2001 and 2006?
- In 2001 the value of their stock was £500,000.
In 2006 the value of their stock was £1.5 million.
What was the percentage rise in the stock value?
- What was the value of their monitors in 2001?
- What was the value of their monitors in 2006?
- What was the percentage increase in value of their stock of monitors between 2001 and 2006?

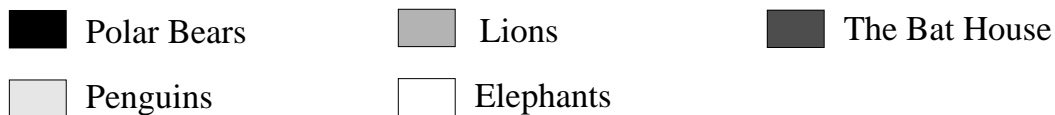
Percentage Bars 2

10b

At a small zoo the main attractions are polar bears, penguins, lions, elephants and the Bat House. The zoo did a survey in 2000, 2003 and 2006 to see what attractions the public liked best. The bars below show the results of these surveys.



Key



- Which animals were the most popular in 2000?
- Which animals were the most popular in 2003?
- Which animals were the most popular in 2006?
- Just before 2003, two of the animal areas were improved. Which do you think these were?
- What percentage of the public favoured the lions in 2003?
- What percentage of the public favoured the penguins in 2000?
- What percentage of the public favoured the Bat House in 2006?
- Over the years, which group of animals have been the least popular?
- This statement is true: "The number of people who favoured the Bat House was greater in 2006 than 2003." Explain why you think it is true.

Constructing a Pie Chart 1

10b

Andrew does a survey. He asks all the students in his year to fill out a questionnaire.

It asks them how many brothers and sisters they have.

He then makes a pie chart of the results.

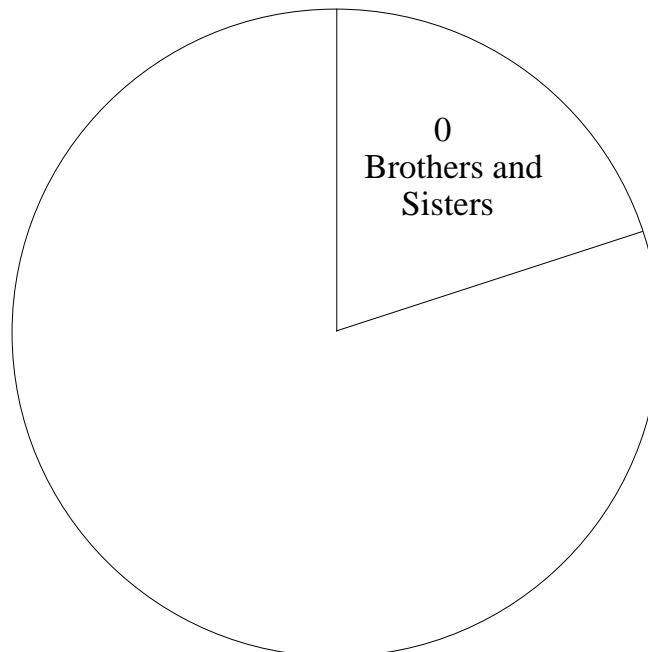
These are his results from the 200 that were returned.

Number of brothers and sisters	Number of students	Number as a percentage	Angle at the centre
0	40	20%	72°
1	80		
2	40		
3	20		
More than 3	20		

He then calculated each number as a percentage and worked out the angle needed at the centre of the diagram. All this information he put into the table above.

Complete the table.

He then carefully constructed a pie chart of these results.



The chart has been started.

Copy and complete it.

Constructing a Pie Chart 2

10b

- 1) The percentage sales at an electrical shop are shown in the following table. Molly draws a pie chart showing this information. First she calculates the angle needed for each type of item sold then she puts the information in this table.

Item	Percentage	Angle needed
Computer	30%	
Camera	20%	
TV	35%	
Radio	5%	
Others	10%	

- a) Finish her calculations for the angles needed.
b) Use these angles to draw a pie chart.
- 2) Victoria likes to watch films. She watches on TV and she goes to the cinema. Over a period of a year she keeps a record of what she watches. She sees a total of 160 films and puts them into categories.

Type of Film	Number Watched	Percentage of Total	Angle needed
Drama	30		
Comedy	36		
Musical	24		
Fantasy	56		
Others	14		

- a) Copy and complete the table above.
b) Use the angles to draw a pie chart.

Comparing Pie Charts

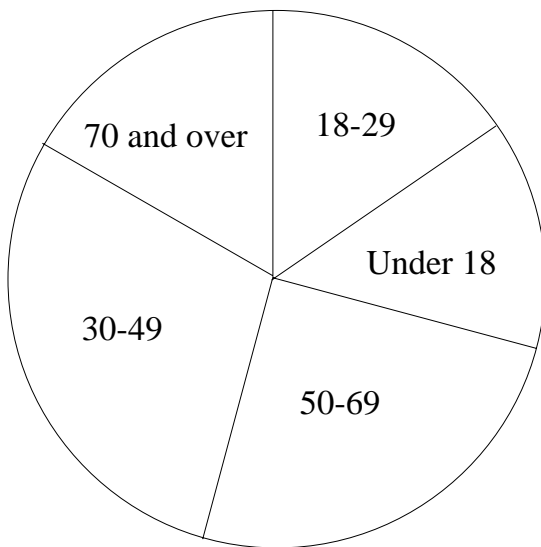
10b

Two grocery shops are owned by the same company. They both sell the same types of goods. One is situated on a housing estate and the other in the middle of town.

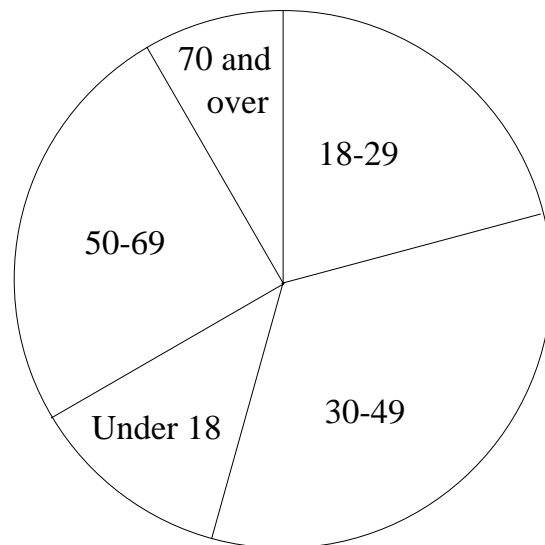
The company carry out a survey to find the ages of their customers.

The pie charts below show the results

Housing Estate Shop



Town Centre Shop



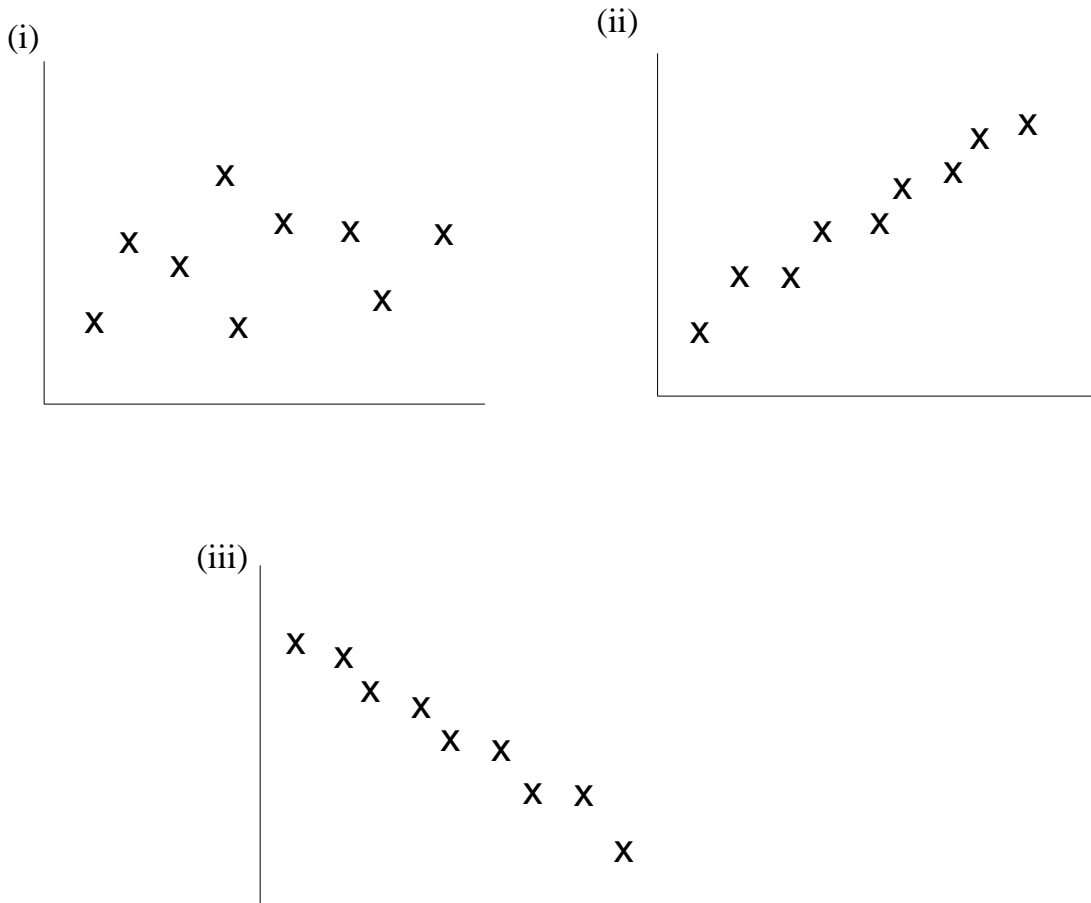
- Which was the largest age group for both shops?
- Leah looks at the charts. She says that more people in the 70 and over age group shopped in the centre of town than on the housing estate. Can she tell just by looking? Explain your answer
- More under 18's went in the town centre shop than in the housing estate shop. What does this tell you about the total number for each shop?
- If 2000 people used the town centre shop, approximately how many were under 18?

Scatter Diagrams

10b

1) William goes on his holiday by car down the motorway. Below are three scatter diagrams indicating this. In each case the horizontal axis represents time and the vertical one distance

One diagram shows his distance from home. Another shows his distance from his destination and the third shows his distance from the nearest service station.



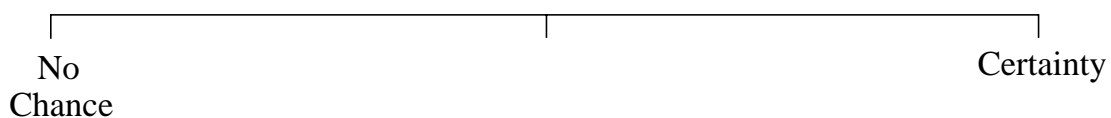
Which plot represents which situation?

- 2) In each of the following situations say which of the above scatter diagram would best represent it (i, ii or iii)
- Weights of children plotted against their age.
 - The value of a car plotted against its age.
 - The distance travelled by a car and the amount of petrol in its tank.
 - The distance travelled by a car and the speed at which it travels.
 - The height of a seedling and the time since planting.
 - The age of a pupil and the size of the house lived in.

Probability 1

10b

- 1) A coin is tossed.
- What is the probability of it coming down heads?
 - What is the probability of it coming down tails?
 - In 10 tosses how many times would you expect it to come down heads?
 - In 10 tosses how many times would you expect it to come down tails?
 - In 50 tosses how many times would you expect it to come down heads?
 - In 50 tosses how many times would you expect it to come down tails?
- 2) A dice is rolled.
- What is the probability of getting a 6?
 - What is the probability of getting a 4?
 - In 12 rolls how many times would you expect to get a 6?
 - In 12 rolls how many times would you expect to get a 4?
 - In 60 rolls how many times would you expect to get a 6?
 - In 60 rolls how many times would you expect to get a 4?
- 3) A bag contains 17 snooker balls, 10 red, 1 green, 1 brown, 1 yellow, 1 blue, 1 pink, 1 black and 1 white.
Joshua puts his hand into the bag to get one out.
- What is the probability that the ball is red?
 - What is the probability that the ball is pink?
 - What is the probability that the ball is white?
 - Copy the line below and mark on it:
 - The probability of it being green.
 - The probability of it being red.



- A ball is taken from the bag. It is red and it is not put back. Is the chance of the next ball drawn being a red good, even or poor? Explain your answer.
- 3 red balls have been drawn from the bag and not put back. Is the chance of the next ball being a red good, even or poor? Explain your answer.

Probability 2

10b

The teacher puts 100 coloured counters into a black bag. Sam puts his hand into the bag and takes out 30 counters, one at a time. He does not put them back. Here is a list of the colours of the 30 counters.

Colour	Number taken out
Red	1
Black	9
White	1
Blue	4
Yellow	15

He puts his hand into the bag to take out the 31st counter.

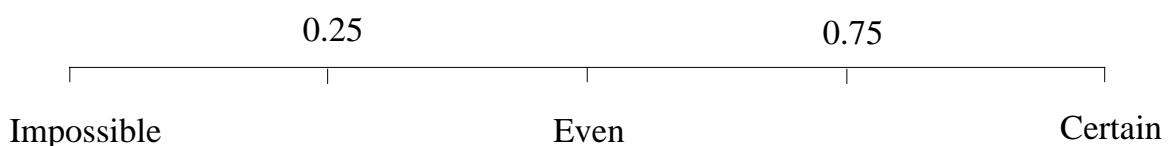
- Which colour is he most likely to take?
- Which colour is he least likely to take? Explain your answer.
- Could there be any more colours?

Alexander's teacher now tells him that there are 5 different colours.

These are the numbers of each colour.

- Colour 1 - 50
- Colour 2 - 26
- Colour 3 - 13
- Colour 4 - 7
- Colour 5 - 4

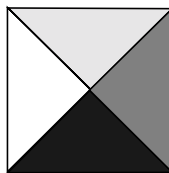
- What colour do you think colour 1 is?
- What colour do you think colour 3 is?
- Explain why you can't tell which colour 4 or 5 is.
- This number line indicates the probability of something happening. Mark on it where you think the probabilities for colours 1, 3 and 5 should be.



Probability 3

10b

- 1) A black bag contains four red counters, three blue counters and two yellow counters. All feel the same to the touch. One is taken from the bag.
- What is the probability it is red?
 - What is the probability it is not red?
 - The first counter drawn is red. It is replaced. What is the probability that the next one taken is red?
 - If it is not replaced,
 - How many counters remain in the bag?
 - How many red counters are in the bag?
 - What is the probability that the next one taken is red?
 - Four counters have been taken from the bag and not replaced. They were two reds and two blues. What is the probability that the next one chosen is yellow?
 - Does the probability of something happening change after each go? Explain.
- 2) A dice is tossed.
- What is the probability that the number showing on the top is 2?
 - What is the probability that the number showing on the top is not 2?
 - The dice is tossed again. What is the probability that the number on the top is 2 this time?
 - In this case, is the probability of something happening affected by what has happened before? Explain.
- 3) A spinner is made in the shape of a square. The quadrants are coloured red, blue, green and yellow.



It is spun.

- What is the probability that the red quadrant is the one lying at the bottom when it stops?
- What is the probability that the yellow quadrant is the one lying at the bottom?
- What is the probability that the red or the yellow quadrant is the one lying at the bottom?
- What is the probability that the red quadrant is not an the bottom?

Results Grids 1

10b

The grid shows the scores in a series of games played by 5 teams. The first score in each box is the home team score and the last is the away score.

		Away				
		A	B	C	D	E
Home	A		1-1	0-1	2-2	3-2
	B	1-1		3-2	1-3	0-1
	C	3-1	2-0		2-2	2-3
	D	2-1	3-1	5-4		4-2
	E	1-2	0-1	3-2	2-2	

Look at the grid then answer these questions.

- a) What was the score when A played at home to C?
- b) What was the score when E played away to D?
- c) How many matches did team C play?
- d) What was team C's total score for all the games?
- e) How many games were played altogether?
- f) What does the table below do?

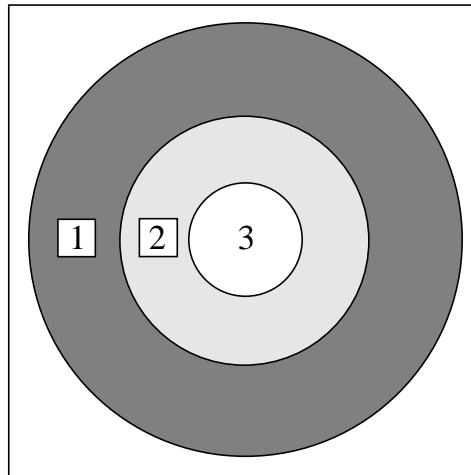
	A	B	C	D	E
A		2	1	4	5
B	2				
C					
D					
E					

- g) Complete this table.
- h) What was the total of all the scores in all the matches?

Results Grids 2

10b

A game is played by throwing two darts into a board. The player gets 3 points when the dart goes in the middle; 2 points when it goes in the band around it and 1 point if it goes in the outer band. A dart which misses has to be taken again.



A game consists of two people each taking 50 turns. Each turn consists of throwing two darts.

The table below shows all the turns played in a game.

		Second Shot		
		1	2	3
First Shot	1	20	14	10
	2	17	10	6
	3	12	7	4

For example, the number of times a 3 was followed by a 2 was 7.

- How many times did they get two 2's?
- What was the most difficult score to get?
- What was the easiest score to get?

This table is used to calculate the probability of getting the scores. For example the probability of getting two 3's is 4 out of 100; or $\frac{4}{100}$; or $\frac{1}{25}$; or 4%; or 0.04

In these write the probability as a fraction in lowest terms, a decimal and a percentage.

- What is the probability of getting two 1's?
- What is the probability of getting two 2's?
- What is the probability of getting a 1 followed by a 2?

Results Grids 3

10b

Two bags each contain 4 counters with the numbers 1 to 4 on them. A counter from bag A is withdrawn followed by a counter from bag B.

a) This grid shows the different ways the counters can be taken from the bags.

Copy and complete it.

		Bag B			
		1	2	3	4
Bag A	1	1,1	1,2		
	2				
	3				
	4				

b) There are 16 different events that can happen. Have they all the same probability of happening?

c) What is the probability of each event happening?

d) What is the probability of getting a 3 followed by a 4?

e) How many outcomes have a number 2 in?

f) What is the probability of getting an outcome with a number 2 in?

The numbers are added together and put into this grid.

		1	2	3	4
		1	2	3	
2					
3					
4					

g) Copy and complete the grid.

h) What is the probability that the numbers add up to 6?

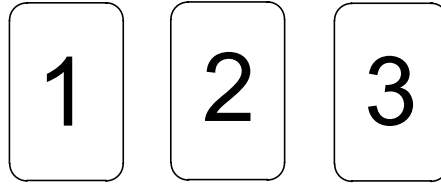
i) What is the most likely total for the two counters?

j) What is the least likely total for the two counters?

Combining Numbers

10b

Christopher has three cards with the numbers 1, 2 and 3 on.



He places them next to each other to make the number 123.

- What is the highest number he can make with these three cards?
- How many three figure numbers can he get altogether? Write them all down in order of size.
- He decides to make two figure numbers with them. He does this on a grid.

	1	2	3
1		12	13
2			
3			

Finish off the grid.

Bethany uses four cards with the numbers 1, 2, 3 and 4 on.

- Write down all the four figure numbers she can make from them. Write them down in order of size, smallest first.
- Use Christopher's grid method to write down all the two figure numbers that can be made from four figures.
- She now knows how many two figure numbers can be made from three figures. She also knows how many two figure numbers can be made from four figures. Can she predict how many two figure numbers can be made from five figures? Try to explain what the rule is.
- Which of these explains the rule in algebraic terms?

(i) $n^2 - 3$

(ii) $n^2 - n$

(iii) $n^2 - 1$

Answers

Whole Numbers - Page 7

- 1) a) Two hundred and ninety three
b) Five hundred and thirty six
c) Eight hundred and thirty four
d) One thousand, eight hundred and thirty four
e) Four thousand five hundred
f) Eleven thousand, four hundred and fifty
g) Seventeen thousand, four hundred and two
h) Twenty seven thousand, nine hundred and sixty four
i) Forty three thousand, seven hundred and forty five
j) Eighty two thousand
k) One hundred thousand
l) One hundred and seventy two thousand
m) Four hundred thousand and fifty
n) Five hundred and sixty five thousand
o) Eight hundred and seventy six thousand, nine hundred and thirty five
p) Nine hundred and eleven thousand, four hundred and sixty
q) One million one hundred thousand
r) One million, two hundred and thirty seven thousand, six hundred and sixty four
s) Two million, five hundred and eighty four thousand, seven hundred and forty seven
t) Three million, three hundred and eighty four thousand
u) Six million, two hundred thousand
v) Seven million, six hundred and seventy two thousand
w) Eleven million, four hundred thousand
x) Twenty three million, seven hundred and sixty one thousand
y) Fifty four million, seven hundred and thirty six thousand, nine hundred and forty six
- 2) a) 270 b) 924 c) 1087 d) 6406 e) 8403 f) 9642
g) 15,480 h) 27,497 i) 22,400 j) 54,761 k) 73,527
l) 107,000 m) 128,006 n) 348,569 o) 609,000
p) 800,054 q) 900,154 r) 1,000,000 s) 1,600,000
t) 1,716,000 u) 5,000,027 v) 7,140,354 w) 9,400,064
x) 15,000,000 y) 21,115,604 z) 27,315,000

10 s, 100 s and 1000 s - Page 8

- 1) a) 50 b) 230 c) 420 d) 860 e) 12410 f) 5340
g) 63 h) 26 i) 4 j) 525 k) 1.4 l) 20.43 m) 1.06
n) 0.36 o) 0.053 p) 1.005 q) 0.012 r) 0.0431
- 2) a) 200 b) 1500 c) 4300 d) 16,500 e) 47,200
f) 64,200 g) 357.6 h) 406 i) 703.4 j) 1690 k) 2760
l) 8430 m) 60 n) 74 o) 36.2 p) 96 q) 4.32 r) 0.641
- 3) a) 4000 b) 38,000 c) 53,000 d) 174,000 e) 300,000
f) 591,000 g) 3500 h) 19,600 i) 45,700 j) 126,400
k) 507,300 l) 8034 m) 500 n) 170 o) 53 p) 503
q) 65 r) 0.5
- 4) From top clockwise
a) 0.254 b) 10 c) 100 d) 10,000 e) 2.54 f) 0.254
g) 1000 h) 25.4 i) 10 j) 10,000 k) 2.54

More 10 s, 100 s and 1000 s - Page 9

- 1) a) 0.7 b) 2.1 c) 40.9 d) 8.31 e) 160.4 f) 5078.4
g) 0.451 h) 0.78 i) 1.756 j) 7.43 k) 168.7 l) 80.45
m) 0.063 n) 0.0563 o) 0.0734 p) 0.0054 q) 0.0036
r) 0.04
- 2) a) 0.06 b) 0.32 c) 8.4 d) 17.4 e) 74.09 f) 500
g) 0.03654 h) 0.0642 i) 0.0894 j) 0.165 k) 0.274
l) 3.41 m) 0.0036 n) 0.00532 o) 0.0074 p) 0.00042
q) 0.00003 r) 0.00021
- 3) a) 0.009 b) 0.037 c) 0.06 d) 0.184 e) 0.853 f) 1.3
g) 0.00853 h) 0.019673 i) 0.0245 j) 0.129 k) 0.4625
l) 7.104 m) 0.0006 n) 0.000643 o) 0.00043
p) 0.000604 q) 0.000053 r) 0.000101
- 4) From the top clockwise
a) 45.8 b) 1 c) 100 d) 1000 e) 4.58 f) 458
g) 0.458 h) 10

Rounding off - Page 10

- 1) a) and b)

2150	2200
1210	1200
1060	1100
1320	1300
1860	1900
2020	2000
2640	2600
- c) Anything between 1745 and 1754 inclusive. d) Anything between 1850 and 1854 inclusive. e) (i) 12,271
(ii) estimate £6 x 12,300 = £73,800
- 2) £7, 30, £210 3) £7 x 1200 = £8400

Negatives 1 - Page 11

- 1)

The first number line ranges from -10 to 7 with tick marks every 1 unit. The second number line ranges from -10 to 14 with tick marks every 2 units. The third number line ranges from -25 to 25 with tick marks every 5 units.
- 2) a) -15, -9, -5, 2, 2.4, 4, 7, 8
b) -2.7, -2.5, -2.2, -1.3, 0.4, 1.3, 3.3, 5.2
c) -8, $-\frac{3}{4}$, $\frac{1}{4}$ -5, $-\frac{1}{4}$, $1\frac{1}{2}$, 2, 3, 6
- 3) a) 35...C b) -15...C c) 7...C d) 11...C e) -4...C f) -2...C
g) 9...C 4) a) 23...C b) 13...C

Negatives 2 - Page 12

- 1) 166...C 2) 33...C 3) -3 4) -3 5) 4
- 6) a) 64 b) -64 c) -64 d) 64
- 7) a) 3 and -3 b) 4 and -4 c) 5 and -5 d) 6 and -6
- 8) a) 1 b) -1 c) 0 d) 2 e) -6 f) -8 g) 4 h) 2 i) 6
j) 0 k) 6 l) 0 m) 1 n) 4 o) 4 p) 2

Multiplication 1 - Page 13

- 1) a) 120 b) 192 c) 172 d) 399 e) 567 f) 592 g) 341
h) 810 i) 532 j) 966 k) 600 l) 648 m) 1632
n) 2585 o) 3100 p) 865 q) 1288 r) 1758 s) 1728
t) 5152 u) 1859 v) 3825 w) 9490 x) 20,239
y) 48,716
- 2) a) 418 b) 648 c) 696 d) 1406 e) 1472 f) 1664
g) 2695 h) 4368 i) 3822 j) 4725 k) 715 l) 1771
m) 5769 n) 1700 o) 5220 p) 3133 q) 7889
r) 13,410 s) 17,958 t) 26,728 u) 33,977 v) 22,260
w) 33,748 x) 34,914 y) 46,986

Multiplication 2 - Page 14

- 1) 1200m 2) 702 3) 192 4) 243 5) 5.44m 6) 20,838
7) 611 8) £3672 9) 100.7cm 10) a) 1701cm b) 17m 1cm

Multiplying Decimals 1 - Page 15

- 1) a) 20.5 b) 20.8 c) 13.6 d) 41.4 e) 58.1 f) 28.8
g) 109.2 h) 113.4 i) 108.1 j) 270.1 k) 34.86
l) 6.97 m) 9.12 n) 21.09 o) 52.64 p) 22.32
q) 23.32 r) 84.69 s) 10.92 t) 18.48 u) 6.33
v) 13.968 w) 45.261 x) 70.135 y) 35.231
2) a) 0.52 b) 1.96 c) 5.22 d) 2.4 e) 5.04 f) 2.94
g) 9.25 h) 15.66 i) 29.61 j) 24.03 k) 17.71 l) 19.2
m) 59.12 n) 33.16 o) 64.05 p) 13.68 q) 9.72
r) 16.11 s) 65.17 t) 33.95 u) 67.32 v) 326.96
w) 595.35 x) 186.42 y) 336.49

Multiplying Decimals 2 - Page 16

- 1) £70.11 2) 294cm 3) £62.25 4) 112.2cm 5) a) 12
b) £16.44 6) 630.2 kilometres 7) a) £20.90 b) £20.55
c) £41.45 8) 293.8cm 9) a) 1056.4cm b) 10m 56.4cm
10) a) 22.88kg b) 23.75kg

Division 1 - Page 17

- 1) a) 11 b) 39 c) 27 d) 21 e) 35 f) 19 g) 94 h) 52
i) 63 j) 162 k) 106 l) 94 m) 159 n) 85 o) 124
p) 92
2) a) 21 b) 12 c) 16 d) 14 e) 21 f) 17 g) 33 h) 25
i) 28 j) 23 k) 16 l) 14 m) 53 n) 17 o) 25 p) 28
3) a) 9r2 b) 40r1 c) 24r1 d) 20r3 e) 52r1 f) 89r1
g) 57r4 h) 63r1 i) 59r1 j) 164r3 k) 75r2 l) 85r2
m) 79r3 n) 127r1 o) 124r3 p) 121r2
4) a) 9r8 b) 11r5 c) 15r11 d) 14 e) 15r4 f) 18 g) 24
h) 15r31 i) 18 j) 12r5 k) 16 l) 19r21 m) 15r13
n) 16 o) 9r18 p) 13

Division 2 - Page 18

- 1) 30cm 2) 8 3) £15 4) 28 5) a) 22 b) 16 6) a) 1800g
b) 72g 7) 6 8) 16 9) 33 10) a) 14 b) 10 c) 140

Division with Decimals 1 - Page 19

- 1) a) 2.1 b) 1.6 c) 4.2 d) 4.8 e) 3.6 f) 12.4 g) 9.7
h) 9.4 i) 18.7 j) 16.2 k) 8.6 l) 15.6 m) 24.6
n) 22.5 o) 25.4 p) 0.7 q) 35.4 r) 31.4 s) 27.4
t) 44.5
2) a) 12.53 b) 14.65 c) 9.5 d) 36.75 e) 7.55 f) 13.44
g) 54.81 h) 19.25 i) 36.44 j) 56.91 k) 0.12 l) 25.58
m) 36.21 n) 23.54 o) 0.25 p) 0.09 q) 3.21 r) 0.48
s) 0.03 t) 1.98
3) a) 3kg b) 0.12kg
4) 0.25 litre 5) 18.5cm 6) £0.64 7) 32.54

Division with Decimals 2 - Page 20

- 1) 9.625 2) £1.56 3) 1.15kg 4) £1.16
5) a) £9.55 b) £5.44 6) a) 110.25sq cm b) 10.5cm
7) a) 2.34 litres b) 0.26 litre or 260ml 8) £53.86
9) 0.35m 10) £17.44

Cancelling Fractions - Page 21

- 1) a) $\frac{1}{2}$ b) $\frac{2}{3}$ c) $\frac{1}{2}$ d) $\frac{1}{3}$ e) $\frac{1}{3}$ f) $\frac{1}{2}$ g) $\frac{1}{3}$ h) $\frac{1}{2}$
i) $\frac{1}{2}$ j) $\frac{1}{7}$ k) $\frac{1}{6}$ l) $\frac{1}{3}$ m) $\frac{2}{7}$ n) $\frac{5}{6}$ o) $\frac{3}{5}$ p) $\frac{1}{10}$ q) $\frac{1}{9}$
r) $\frac{3}{4}$ s) $\frac{3}{4}$ t) $\frac{1}{3}$ u) $\frac{1}{10}$ v) $\frac{1}{3}$ w) $\frac{1}{16}$ x) $\frac{1}{15}$ y) $\frac{5}{12}$
2) $\frac{4}{20}$ $\frac{3}{15}$ $\frac{2}{10}$ $\frac{5}{25}$
3) $\frac{1}{30}$ $\frac{1}{5}$ $\frac{1}{4}$ $\frac{1}{20}$ $\frac{1}{2}$ $\frac{1}{10}$ $\frac{24}{30}$ $\frac{45}{50}$
4) $\frac{3}{10}$ 5) $\frac{19}{28}$ 6) $\frac{5}{18}$ 7) $\frac{1}{6}$

Mixed Fractions - Page 22

- 1) 10 2) a) $\frac{3}{10}$ b) $\frac{2}{5}$ c) $\frac{9}{20}$ d) $\frac{3}{4}$ e) $\frac{11}{16}$ f) $\frac{11}{20}$ g) $\frac{5}{12}$
h) $\frac{8}{25}$ i) $\frac{1}{30}$ j) $\frac{4}{7}$
3) $\frac{3}{8}$ 4) 5 5) 12 6) $\frac{1}{3}$ 7) $\frac{1}{30}$ 8) $\frac{1}{6}$ 9) $\frac{5}{13}$ 10) $\frac{8}{17}$

Calculating a Fraction - Page 23

- 1) a) 9 b) 30 c) 4 d) 16 e) 18 f) 15 g) 40 h) 15
i) 49 j) 6 k) 35 l) 12 m) 50 n) 18 o) 40 p) 20
2) a) 10m b) 15kg c) 12km d) £32 e) 36 days
f) 21 litres g) 21km h) 45kg i) £100 j) £14.40
k) £11.25 l) £42.40
3) a) £34.40 b) £9.38 c) £4.44 d) 12.5m e) 38.5kg
f) 64.8km g) 9.375km h) 52.5kg i) £37.50 j) £18.20
k) £5.10 l) 27.5 litres

Fraction Problems - Page 24

- 1) a) $\frac{3}{5}$ b) 570 c) 380 2) £253 3) £760 4) a) $\frac{3}{10}$ b) 105
5) a) $\frac{5}{8}$ b) 35,250 6) a) $\frac{3}{8}$ b) 3 litres and 1.8 litres
7) a) $\frac{5}{12}$ b) 17.5g 8) £43.75

Adding and Subtracting Fractions 1 - Pg 25

- 1) a) 1 b) 1 c) 0 d) $2\frac{1}{2}$ e) $3\frac{3}{4}$ f) $3\frac{1}{4}$ g) $2\frac{1}{2}$ h) $1\frac{1}{4}$
i) $2\frac{1}{4}$ j) $2\frac{1}{4}$ k) $6\frac{3}{4}$ l) $7\frac{1}{2}$ m) $3\frac{1}{4}$ n) $\frac{3}{4}$ o) $7\frac{1}{4}$
2) a) $\frac{4}{5}$ b) $\frac{6}{7}$ c) $\frac{5}{8}$ d) $\frac{1}{10}$ e) $\frac{1}{9}$ f) $\frac{9}{13}$ g) $\frac{1}{3}$ h) $\frac{1}{5}$ i) $\frac{4}{9}$
j) $\frac{6}{11}$ k) $\frac{3}{16}$ l) $\frac{13}{20}$
3) a) $3\frac{2}{5}$ b) $7\frac{5}{6}$ c) $3\frac{1}{4}$ d) $5\frac{1}{10}$ e) $\frac{11}{12}$ f) $8\frac{1}{11}$ g) $3\frac{1}{6}$
h) $8\frac{1}{8}$ i) $9\frac{2}{3}$ j) $7\frac{3}{5}$ k) 1 l) $11\frac{13}{20}$

Adding and Subtracting Fractions 2 - Page 26

- 1) a) $\frac{1}{2}$ b) $\frac{1}{3}$ c) $\frac{1}{4}$ d) $\frac{1}{3}$ e) $\frac{1}{3}$ f) $\frac{1}{3}$ g) $\frac{1}{4}$ h) $\frac{3}{4}$ i) $\frac{3}{4}$
j) $\frac{2}{5}$ k) $\frac{3}{8}$ l) $\frac{4}{9}$ m) $\frac{3}{5}$ n) $\frac{2}{5}$
2) a) $\frac{3}{4}$ and $\frac{2}{4}$ b) $\frac{5}{8}$ and $\frac{2}{8}$ c) $\frac{9}{30}$ and $\frac{8}{30}$ d) $\frac{1}{10}$ and $\frac{4}{10}$
e) $\frac{4}{9}$ and $\frac{3}{9}$ f) $\frac{10}{24}$ and $\frac{9}{24}$ g) $\frac{3}{30}$ and $\frac{14}{30}$ h) $\frac{15}{21}$ and $\frac{5}{21}$
i) $\frac{21}{36}$ and $\frac{10}{36}$ j) $\frac{21}{42}$ and $\frac{4}{42}$ k) $\frac{3}{14}$ and $\frac{6}{14}$ l) $\frac{29}{80}$ and $\frac{12}{80}$
3) a) $\frac{3}{8}$ b) $\frac{1}{2}$ c) $\frac{1}{2}$ d) $\frac{1}{16}$ e) $\frac{2}{3}$ f) $\frac{19}{24}$ g) $\frac{5}{6}$ h) $\frac{1}{12}$
i) $\frac{1}{20}$ j) $\frac{35}{48}$ k) $\frac{1}{8}$ l) $\frac{39}{50}$
4) a) $\frac{1}{8}$ b) $\frac{1}{16}$ c) $\frac{1}{5}$ d) $\frac{1}{10}$ e) $\frac{1}{16}$ f) $\frac{3}{16}$ g) $\frac{1}{20}$ h) $\frac{13}{24}$
i) $\frac{1}{36}$ j) $\frac{1}{6}$ k) $\frac{1}{24}$ l) $\frac{1}{6}$

Calculating Percentages - page 27

- 1) a) £1.25 b) £6.20 c) £3 d) £3.50 e) £10.50 f) £6
g) 54p h) 27p i) 81p j) 72p k) 36p l) £1.08 m) 83p
n) £1.66 o) £2.49
2) a) 40, 60 b) 60, 210 c) 90, 405 d) 20, 130 e) 80, 680
f) 50, 475 g) 44, 52.8 h) 22, 52.8 i) 55, 264
j) 70p, £3.78 k) 70p, £5.88 l) 70p, £6.72 m) 24p, 36p
n) 96p, £4.32 o) 44p, £2.86
3) a) 2, 4 b) 9, 54 c) 4, 36 d) 5, 85 e) 6, 138
f) 7, 357 g) 3.3, 115.5 h) 4.5, 292.5 i) 6.2, 589

- j) 8p, £2.16 k) 4p, £3.12 l) 3p, £2.43 m) 5p, 85p
 n) 6.5p, £4.68 o) 9.5p, £2.47
 4) a) 4.08kg b) 4.42kg c) 82.72kg d) 16.64m e) 4.76m
 f) 11.52m g) 3.045 litres h) 8.28 i) 24.408 litres
 j) 30.75 k) £43.51 l) 54.34 m) 38.16 n) 37.496m
 o) 10.37

Calculating Percentages 2 - Page 28

- 1) a) £97.50 b) £552.50 2) a) £32 b) £64 c) £3.20
 d) £9.60 e) £73.60
 3) a) £5.80 b) £2.90 c) £1.45 d) £10.15
 4) a) £525 b) £7
 5) a) £28 b) £2.80 c) £50.40
 6) a) 45% b) 540 c) 660 d) 132 e) 81

Fractions, Decimals and Percentages - Pg. 29

- 1) a) 30% b) 70% c) 90% d) 17% e) 23% f) 67%
 g) 83% h) 2% i) 9% j) 13.7% k) 1.3% l) 7%
 m) 7.13% n) 23.7% o) 84.1%
 2) a) $\frac{1}{10}$ b) $\frac{1}{2}$ c) $\frac{2}{5}$ d) $\frac{4}{5}$ e) $\frac{9}{10}$ f) $\frac{1}{4}$ g) $\frac{3}{4}$ h) $\frac{9}{20}$
 i) $\frac{7}{20}$ j) $\frac{11}{20}$ k) $\frac{1}{3}$ l) $\frac{2}{3}$ m) $\frac{9}{50}$ n) $\frac{27}{50}$ o) $\frac{19}{50}$ p) $\frac{6}{25}$
 q) $\frac{1}{20}$ r) $\frac{1}{40}$ s) $\frac{3}{40}$ t) $\frac{1}{40}$
 3) a) 0.1 b) 0.5 c) 0.25 d) 0.2 e) 0.05 f) 0.02 g) 0.04
 h) 0.01 i) 0.005 j) 0.004
 4) a) 0.3 b) 0.7 c) 0.75 d) 0.03 e) 0.23 f) 0.002
 g) 0.15 h) 0.075 i) 0.14 j) 0.46
 5) a) 0.9, 90% b) 0.4, 40% c) 0.22, 22% d) 0.35, 35%
 e) 0.225, 22.5% f) 0.53, 53% g) 0.12, 12% h) 0.02, 2%
 i) 0.17, 17% j) 0.28, 28%

Ratio and Proportion 1 - Page 30

- 1) a) 2 : 1 b) 5 : 2 c) 13 : 8 d) 6 : 5 2) 150 : 100
 3 : 2
 3) 70 : 50 : 30 4) 30cm and 15cm 5) £250 and £200
 7 : 5 : 3
 6) a) £350 b) 6:7 7) a) 2000 b) 5100 8) 1 : 3 or 3 : 1

Ratio and proportion 2 - Page 31

- 1) a) £200 : £160 b) £280 : £200 c) £528 : £440
 d) £440 : £352 : £176 e) £36 : £54 : £72
 f) £134 : £201 : £268
 2) a) $4\frac{1}{2}$ metres b) 12m 3) £25 and £5
 4) a) 196g, 70g, 14g 5) 16 6) a) 3 b) 4 7) 1 : 2 or 2 : 1
 8) a) $\frac{3}{5}$ b) 2 : 3 9) a) 45% b) 1300

Checking - Pg 32

Some of these values will vary from pupils answers.

- 1) a) 500 b) 800 c) 600 d) 2000 e) 4200 f) 2000
 g) 4500 h) 8400 i) 10,000 j) 14,000 k) 28,000
 l) 60,000
 2) c, e 3) a) 15 b) 30 c) 100 d) 40 e) 70 f) 30
 g) 70 h) 2 i) 40 j) 15 k) 10 l) 15
 4) c, d, g, h 5) c, e, h, i 6) c, d, g, h, j, k

Adding Letters and Numbers - Page 33

- 1) a) 4a b) $2x + 2y$ c) $2v + 2w$ d) $w + x + y + 20$ e) $8x$
 2) a) $2x + 72$ b) $4x + 54$ c) $6x + 54$ d) $4x + 90$

Simplifying Expressions 1 - Page 34

- 1) a) $8x$ b) $12y$ c) $5a$ d) $7p$ e) $5c$ f) b g) $3c$ h) 0
 i) t j) $5x$ k) $2y$ l) $2p$
 2) a) $4x + 3$ b) $27r + 4$ c) $4a + 5$ d) $6 - 3b$ e) $4y + 5$
 f) $7 + 6k$ g) $7 - 5c$ h) $1 + 4d$ i) $2t + 3s$ j) $9h - 2$

- 3) a) $6a + 8$ b) $5b + 1$ c) $2x + 8$ d) $4b - 3$ e) $3n + 1$
 f) $9k - 6$ g) $c + 11$ h) $13d - 7$ i) $13s - t$ j) $3t + 9s$
 4) a) $3n + m$ b) $7k - 5j$ c) $10d - c$ d) $12d - 5e$
 e) $t + 11s$ f) $3t + 7s$ g) $12a + 6b$ h) $14x + y$
 i) $7v + 5w$ j) $p - q$
 5) a) $3m - 8$ b) $12k - 11j$ c) $15d - 6c$ d) $2d - 8e$
 e) $13s$ f) $18 - 3t$ g) $15b + 3$ h) $6x - 3y$ i) $v + 17w$
 j) $3 - 2c$ k) $3c + 8d$ l) $2a - 1$

Simplifying Expressions 2 - Page 35

- 1) a) $4a$ b) $2b$ c) $5c$ d) $5d$ e) $5w$ f) $8x$ g) $4y$ h) $3z$
 i) p^2 j) q^2 k) r^3 l) s^3 m) $20h$ n) $35i$ o) $8j$ p) $6k$
 q) $4e^2$ r) $5f^2$ s) $2g^2$ t) $3h^2$ u) $6l^2$ v) $20m^2$
 w) $21n^2$ x) $32p^2$
 2) a) 3 b) 2 c) 4 d) 3 e) $4x$ f) $3x$ g) $5x$ h) $11x$
 i) 1 j) 1 k) 3 l) 4 m) 2 n) 2 o) 6 p) 3 q) $1\frac{1}{2}$
 r) $1\frac{1}{2}$ s) $1\frac{1}{2}$ t) $1\frac{1}{2}$
 3) a) $2x$ and $2 \times x$ b) $x + 2$ c) $x \times x$ d) x^3 e) $\frac{x}{2}$ f) $x \times x$
 g) x^2 h) $2x - x$ and x i) x and $2 \times x$ j) $x \times x$ k) $x - 2$
 l) $x + 2$

Substitution 1 - Page 36

- 1) a) $£5.70 \times 8 = £45.60$ b) $£5.70 \times 15 = £85.50$
 2) a) £190 and £178 b) £295 and £290 c) 12 hours
 3) a) £10.90 b) £5.80 c) 5

Substitution 2 - Page 37

- 1) a) 50.272 square centimetres b) 84.95968 sq. cms
 c) 6cm
 2) a) 46 b) 55 c) 218 d) 35.3 e) 49.35 f) 88
 3) 108 4) 91 5) 34.4 6) 34.2 7) 49 8) 70 9) 52
 10) 52 11) 9 12) 34 13) 147 14) 20 15) 54 16) 75

Brackets 1 - Page 38

- 1) a) 8 b) 35 c) 28 d) 25 e) 42 f) 24 g) 8 h) 15
 i) 24 j) -7 k) 14 l) 15 m) 21 n) -72 o) -48
 p) -6 q) 0 r) -45
 2) a and g b and k c and l d and f e and p h and q
 i and m j and n o and r
 3) a) $10 - 2y$ b) $12 + 3a$ c) $20 - 5x$ d) $2b - 2b$
 e) $3c - 2c$ f) $5y - y$ g) $7d - d$ h) $2p^2 + p$
 i) $3g^2 + 4g$ j) $2t^2 - 4t$ k) $10f - 20r$ l) $6r - 10h$
 m) $-16x$ n) $30y + 12y^2$ o) $8t + 12t^2$
 4) a) $3y + 1$ b) $3x + 7$ c) $2a + 2$ d) $6a + 4$ e) $5b + 9$
 f) $2a - 13$ g) $6d + 2$ h) $8x - 6$ i) $7y + 1$ j) $9x - 5$
 k) $9a + 2b$ l) $7a + 5b$ m) $5x + 3y$ n) $11x + 2y$
 o) $11y + x$ p) $9a + 2b$

Brackets - Page 39

- 1) a) $7y + 5$ b) $8y + 5$ c) $7a - 1$ d) $7a + 4$ e) $10x - 1$
 f) $14x - 16$ g) $10x + 4y$ h) $10a - 13b$
 2) a) 11 b) 11 c) 13 d) 14 e) $5x$ f) $11y$ g) $12a$ h) $11b$
 i) $5a + 2$ j) $8 + 3b$ k) $8 + 4b$ l) $9 + 3y$ m) $7 + 4b$
 n) $9 + 2b$ o) $9 + 6y$
 3) a) -8 b) 10 c) 11 d) -7 e) $-3b - 4$ f) $5a + 6$
 g) $-7d + 4x$ h) $3x + 5$ i) $6y - 4x$
 4) a) 8 b) 13 c) 12 d) -1 e) 6 f) 3 g) 5 h) 22
 i) 3 j) 4
 5) a) $-2y + 1$ or $1 - 2y$ b) 3 c) $5x - 1$ d) $3c + 7$ e) $b + 12$
 f) $y + 13$ g) $6a + 11$ h) $5x + 2$ i) $4c - 3$
 j) $-4 + 13a$ or $13a - 4$ k) $3 + 15x$ l) $5c$

Multiplying a Bracket by a Bracket - Page 40

- 1) a) 110 b) 84 c) 42 d) 120 e) 70 f) 143
 2) a) 56 b) 169 c) 117 d) 126 e) 112 f) 104
 3) a) $22 + 11x$ b) $8x + 32$ c) $7x + 21$ d) $36 + 6x$

- e) $84 + 12x$ f) $52 + 13x$ g) $8x + 72$ h) $6x + 30$
 i) $17x + 51$ j) $42 + 6x$ k) $22 + 11x$ l) $16 + 4x$
 4) a) $20 + 9x + x^2$ b) $12 + 8x + x^2$ c) $35 + 12x + x^2$
 d) $x^2 + 9x + 20$ e) $x^2 + 9x + 18$ f) $x^2 + 10x + 21$
 g) $8 + 9x + x^2$ h) $x^2 + 13x + 40$ i) $x^2 + 14x + 45$
 j) $30 + 11x + x^2$ k) $x^2 + 15x + 56$ l) $18 + 9x + x^2$

Finding Missing Expressions - Page 41

- 1) a) 3 b) 1 c) 5 d) 8 e) 10 f) 7 g) $3a$ h) d
 i) a j) $7x$ k) $3y$ l) x
 2) a) $3y - 7$ b) $2c - 3$ c) $6w - 5$ d) $3c + 7$ e) $2w + 8$
 f) $s - 5$ g) $3x + 8$ h) $y - 6$ i) $4a - 3$ j) $3b + 7$
 k) $2y + 4$ l) $5x + 9$
 3) a) $2x$ and $3y - 4$ b) $a + 6$ and $2b + 9$

Equations 1 - Page 42

- 1) a) 8 b) 10 c) 14 d) 4
 2) a) 15 b) 14 c) 19 d) 14 e) 14 f) 11 g) 2 h) 5
 i) 8 j) 7 k) 3 l) 17 m) 10 n) 21 o) 30
 3) a) 3 b) 8 c) 6 d) 12 e) 6 f) 15 g) 9 h) 19
 i) 14 j) 12 k) 13 l) 15 m) 15 n) 25 o) 27
 4) a) 3 b) 6 c) 23 d) 7 e) 11 f) 15 g) 5 h) 10
 i) 20 j) 11 k) 13 l) 16 m) 9 n) 7 o) 8
 5) a) 2 b) 3 c) 5 d) 4 e) 2 f) 5 g) 6 h) 15 i) 3
 j) 10 k) -4 l) 7

Equations 2 - Page 43

- 1) a) 5 b) 7 c) 3 d) 11
 2) a) 3 b) 4 c) 3 d) 5 e) 10 f) 12 g) 5 h) 5 i) 4
 j) 5 k) 5 l) 4 m) 3 n) 4 o) 9 p) 2 q) 8 r) 5
 3) a) 5 b) 4 c) 6 d) 7 e) 7 f) 6 g) 9 h) 10 i) 6
 j) 3 k) 4 l) 4 m) 7 n) 6
 4) a) 3 b) 3 c) 6 d) 2 e) 5 f) 8 g) 7 h) 9 i) 4
 j) 7 k) 16 l) 9

Equations 3 - Page 44

- 1) a) 12 b) 8 c) 18 d) 35 e) 24 f) 35 g) 15 h) 25
 i) 24 j) 21 k) 48 l) 49
 2) a) 27 b) 33 c) 45 d) 68 e) 21 f) 17.5 g) 3.5
 h) 3.5 i) 6.3 j) 2.8 k) 2.4 l) 4.5
 3) a) 3 b) 4 c) 8 d) 3 e) 11 f) 6 g) 3 h) 2 i) 18
 j) 12 k) 2 l) 3

Number Rules - Page 45

- 1) 6, 12, 15, 18 2) 4, 8, 12, 16, 24 3) $2n, 3n, 4n, 5n$
 4) 6, 8, 10, 12, 13 5) 7, 8, 9, 15, 16
 6) $n + 2, n + 3, 2n + 1, 2n + 2, 2n + 3$
 7) 10, 12, 5, 16 8) 13, 6, 18, 20
 9) $2n + 1, 2n + 2, 3n + 1, 3n + 2$
 10) 11, 15, 17 11) 14, 12, 19
 12) $2n + 2, 2n + 1, n, 3n, 3n + 1, 3n + 2$

Number grids - Page 46

- 39
 36, 75
 39, 50, 117
 4, 26, 45
 22, 33, 44
 77, 88, 231
 56, 67, 201
 $n + 11, n + 22, 3n + 33$

Number Patterns 1 - Page 47

- 1) a) 18, 21 adding 3 b) 22, 24 adding 2
 c) 30, 35 adding 5 d) 32, 35 adding 3
 e) 19, 22 adding 3 f) 40, 47 adding 2, 3, 4, 5 etc
 g) 29, 33 adding 4 h) 64, 76 add 2, 4, 6, 8, 10 etc
 i) 6, 3 subtracting 3 j) 25, 22 subtract 3

- k) 5, 0 subtract 5 l) 26, 19 subtract 7
 m) $-10, -13$ subtract 3 n) $-10, -8$ add 2
 o) $-8, -11$ subtract 3 p) 29, 41 add 12
 q) 3, 6 add 3 r) 0, 2 add 2
 s) 6, 12 add 1, 2, 3, 4 etc t) 3, 10 add 2, 3, 4, 5 etc
 2) a) 21 b) 41 c) multiply the number of hexagons by 5
 then add 1 d) $m = 5h + 1$ e) 71 f) 17 g) 23 and 2 left
 over

Number Patterns 2 - Page 48

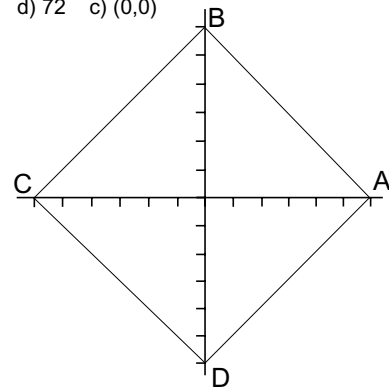
- a) 4 white and 5 dark b) 6 white and 7 dark
 c) 10 white and 15 dark d) 15 white and 21 dark
 e) each row of tiles is one bigger each time
 f) 55 g) 0, 1, 3, 6, 10 etc. Same as dark tiles but one space
 behind - triangular numbers. h) 45 i) 100 j) 3, 6, 9

Negative co-ordinates 1 - Page 49

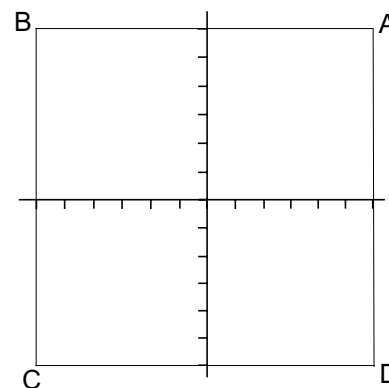
- 1) a) Rhombus b) (6,5) ($-5,3$) ($-7,-8$) and (4, -6)
 e) (2, -4) f) no AB goes horizontal 11 and vertical 2. EF
 goes horizontal 7 and vertical 2. If parallel these would
 have to be in the same ratio. g) no. Same as f.
 h) no. sides would have to be parallel.

Negative Co-ordinates 2 - Page 50

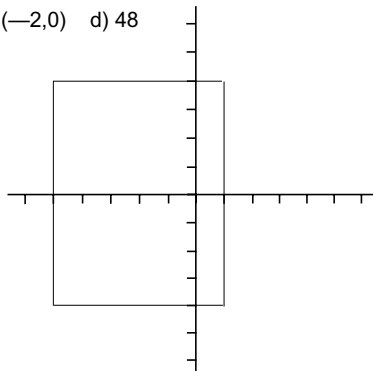
- 1) c) Square d) 72 c) (0,0)



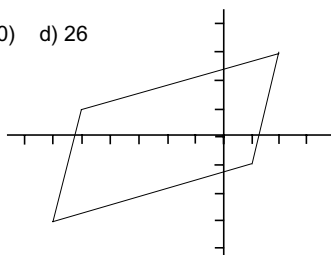
- 2) c) Square d) 144 c) this is twice as big



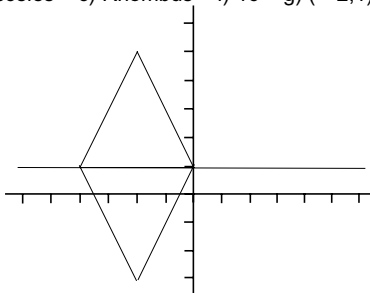
- 3) b) (1, -4) c) (-2, 0) d) 48



- 4) b) (-5, 1) c) (-20) d) 26



- 5) a) Isosceles c) Rhombus f) 16 g) (-2, 1)



Negative Co-ordinates 3 - Page 51

- a) A $x = -10$ B $x = -6$ C $x = -2$ D $x = 8$ E $y = 8$
 F $y = 6$ G $y = -4$ H $y = -7$
 b) $y = 0$ $x = 0$ c) x parallel... y

Negative Co-ordinates 4 - Page 52

- a) A $y = x + 9$, B $y = x$, C $y = x - 4$, D $y = x + 9$
 b) parallel c) 45... d) 45... e) 1

Trial and Improvement 1 - Page 53

- 1) 34 2) 24 3) 45 4) 27 5) 34 6) 34 7) 45 8) 44
 9) 34

Trial and Improvement 2 - Page 54

- 1) a) 2.7 b) 3.6 c) 4.9 d) 7.3 e) 8.2 f) 6.4 g) 8.8
 h) 9.4
 2) 2.4 by 4.8 3) a) 8.4 b) the square 70.56 and 62.72
 4) a) 12.4 b) 7.4 and 3.7 5) a) 4 times b) 4.8, 9.6 and 19.2

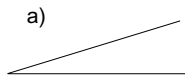
Angles - Page 55

- 1) A 39... B 49... C 107... D 30... E 293... F 267...

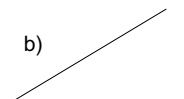
G 310... H 63...

2)

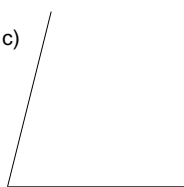
a)



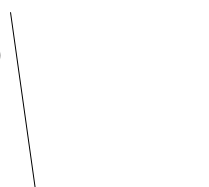
b)



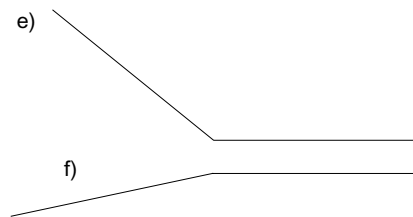
c)



d)



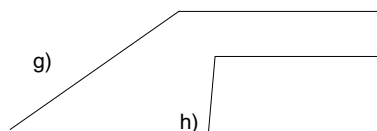
e)



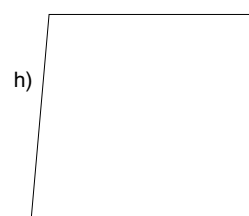
f)



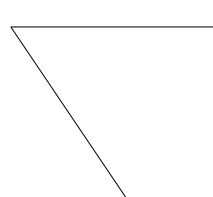
g)



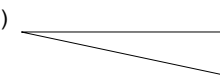
h)



i)



j)



Triangles - Page 56

- a) 110... b) 57... c) 43... d) 87... e) 109... f) 74... g) 60...
 h) 40...

Angles at a Point - Page 57

- a) 128... b) 27... c) 153... d) 52... e) 142... f) 99...
 g) 68... h) 31... i) 149... j) 95... k) 98... l) 59... m) 68...

Drawings - Page 58

See the diagram at the back of the book.

Angles of Quadrilaterals - Page 59

- a) 45... b) 90... c) 60... d) 100... e) 65... f) 90... g) 28...
 h) 30... i) 85...

Regular Polygons - Page 60

- 1) a) 60... 2) a) 90... b) 90... 3) a) 108... b) 72...
 4) a) 120... b) 60... 5) a) 135... b) 45...

Intersecting and Parallel Lines - Page 61

- a) 63... b) 117... c) 117... d) 78... e) 102... f) 78... g) 102...
 h) 118... i) 62... j) 62... k) 118... l) 123... m) 50... n) 130...
 o) 130... p) 55... q) 55... r) 32... s) 148... t) 105... u) 133...
 v) 152... w) 28...

Instructions 1 - Page 62

Examples

- | | | |
|---|---|--|
| a) Turn right 90...
Forward 100
Turn right 90...
Forward 200 | b) Turn left 90...
Forward 200
Turn left 90...
Forward 300 | c) Turn right 90...
Forward 600
Turn left 90...
Forward 300
Turn left 90...
Forward 200 |
|---|---|--|

- d) One solution is:-
Forward 300
Turn right 90...
Forward 400
Turn right 90...
Forward 500
Turn right 90...
Forward 300
Turn right 90...
Forward 200
Turn right 90...
Forward 500
Turn right 90...
Forward 300
Turn right 90...
Forward 200

Instructions 2 - Page 63

- | | | |
|---|--|---|
| a) Turn right 90...
Forward 100
Turn left 60...
Forward 100
Turn right 60...
Forward 100 | b) Turn right 90...
Forward 100
Turn right 60...
Forward 100
Turn right 60...
Forward 100 | c) Turn left 150...
Forward 100
Turn left 60...
Forward 100
Turn right 60...
Forward 100 |
|---|--|---|
- d) Turn right 90...
Forward 100
Turn right 60...
Forward 100
Turn left 60...
Forward 100
Turn left 180...
Forward 100
Turn left 60...
Forward 100
- e) Turn right 90...
Forward 100
Turn right 60...
Forward 100
Turn left 60...
Forward 100
Turn right 60...
Forward 100
Turn right 60...
Forward 100
Turn left 60...
Forward 100

Nets of Cubes - Page 64

- a) Type 1 b) Four vertical squares with one on either side
c) Type 2: Four vertical squares with two on one side.
d) yes
e) Examples of two nets that work.

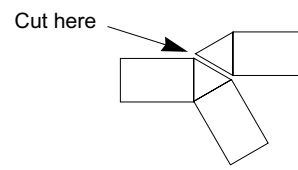


Nets of Cuboids - Page 65

- a) Type 1 are nets. Type 2, 3 and 4 are not.
b) Type 1: 4 vertical, with one on either side. Sides of wrong rectangles come together.
c) Type 2: 4 vertical, with one on either side but same shaped sides coming together.
d) Type 3: 4 vertical, with two on one side.
e) Type 4: wrong sides coming together.
f) Yes

Nets of triangular Prisms - Page 66

a, b, d, e, f and h



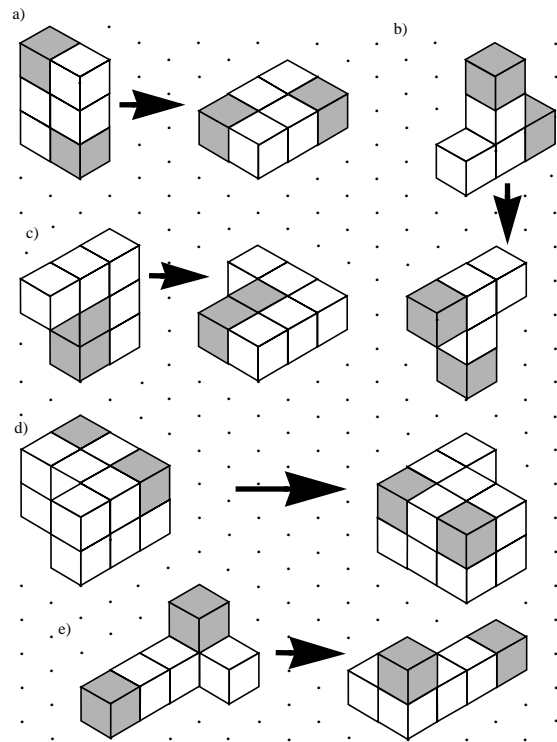
Areas and Perimeters 1 - Page 67

- a) 171 cm², 56cm b) 209cm², 60cm c) 144cm², 58cm
d) 210cm², 62cm e) 144cm², 56cm f) 126nm², 66cm
g) 212cm², 120cm

Areas and Perimeters 2 - Page 68

- 1) a) 50 b) 2500 2) £3024
3) a) 17,702m² b) 1.7702 hectares
4) £702.45 5 a) 110cm² b) 12.2 litres c) 7 tins
6) a) $\frac{1}{16}$ b) 10,000cm² c) 625cm²

Missing Blocks - Page 69

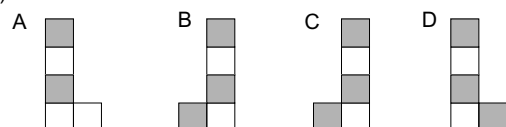


Enlargements - Page 70

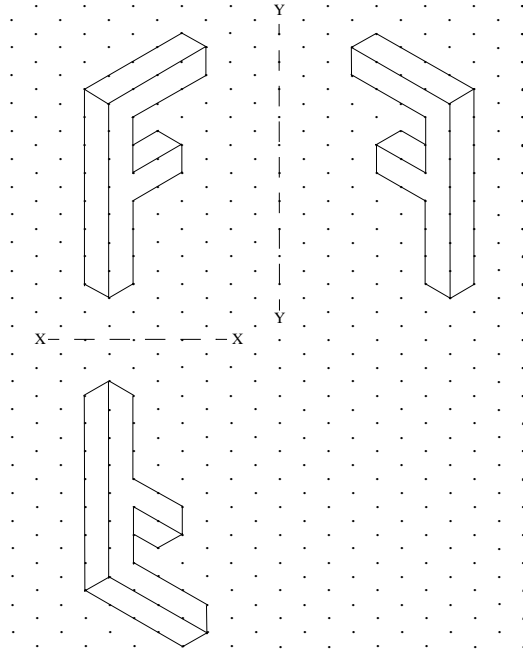
- a) 8 b) (i) 2 (ii) 3 (iii) 4 (iv) 12 (v) 5 (vi) 5
c) (i) 16 (ii) 24 (iii) 32 (iv) 96 (v) 40 (vi) 40
d) 27 e) (i) 54 (ii) 81 (iii) 108 (iv) 324 (v) 135 (vi) 135

Viewing Shapes - Page 71

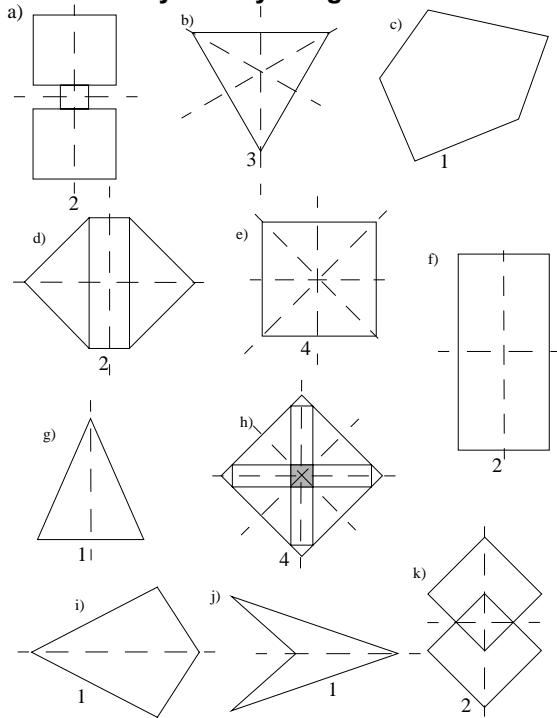
- 1) a) (i) C (ii) B (iii) D (iv) A b)



Drawing F s - Page 72



Rotational Symmetry - Page 73



Metric and Imperial Measure - Page 74

All answers are approximate.

- 1) 480km 2) 1 and 2 3) a) 30.5cm b) 2.54cm
c) 170.3cm 4) 421km 5) a) 5 b) 4
- 6) 28 grams, 28grams, 454 grams, 14 grams, 284ml
- 7) a) 2 b) 2.2 8) 5kg

Estimating Measures - Page 75

- 1) a) miles, kilometres b) metres c) cm d) minutes
e) grammes f) litres, gallons g) mm h) inches i) ml
- 2) a) 8 metres b) 1000 c) 50 litres d) 4kg e) 1.5kg
f) 40 minutes, 6 minutes g) 10kg h) 500 metres

„ - Page 76

Answers are approximate

- 2) a) 22 b) 31.4 c) 40.8cm

Circumference of a Circle - Page 77

- 1) a) 12cm, 18cm and 26cm b) 36cm, 54cm, 78cm
- 2) 37.68cm, 56.52cm, 81.64cm
- 3) 37.704cm, 56.556cm, 81.692cm
- 4) a) 51cm, 66cm, 96cm
b) 53.414cm, 69.124cm, 100.544cm

Area of a Circle - Page 78

- 1) a) 3.5cm, 6cm and 8.5cm
b) 12.25cm^2 , 36cm^2 and 72.25cm^2
c) 36.75cm^2 , 108cm^2 and 216.75cm^2
- 2) 38.465cm^2 , 113.04cm^2 and 226.835cm^2
- 3) 38.4895cm^2 , 113.112cm^2 and 227.0095cm^2
- 4) a) 432cm^2 , 243cm^2 , 147cm^2
b) 452.448cm^2 , 254.502cm^2 , 153.958cm^2

Circumference and Area of a Circle - Page 79

- 1) a) 300cm b) 942.6cm
- 2) a) 14cm b) 196cm c) 615.832cm^2
- 3) a) 106.828cm b) 2136.56cm c) 9 times
- 4) Square is 81cm^2 Circle is 78.55cm^2

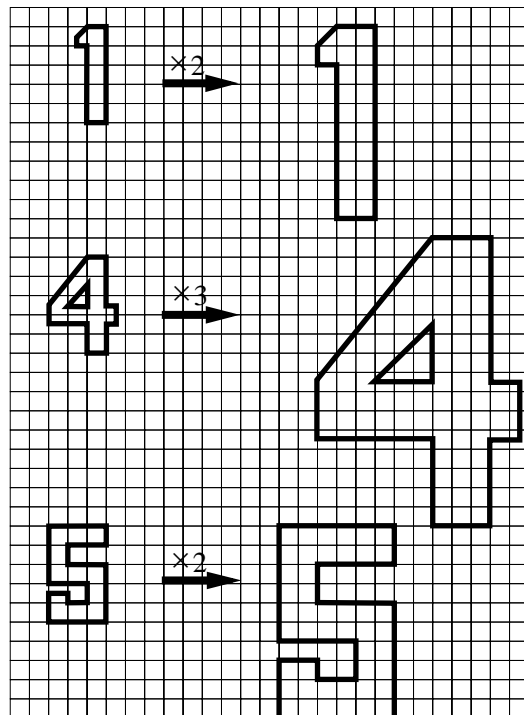
Areas of Rectangles - Page 80

- 1) a) 48cm^2 b) 104.5cm^2 c) Half of the area of the rectangle
d) (iv) Half the base multiplied by the height
- 2) a) isosceles b) 28cm^2 c) Area = half $b \times h$ etc

Volumes - Page 81

- 1) a) 210cm^3 b) 324cm^3 c) 144cm^3 d) 36.75cm^3
e) 196cm^3 f) 231cm^3
- 2) a) 100 b) 1,000,000 c) 1000 d) 70 litres

Enlarging Numbers - Page 82



Mean and Range 1 - Page 83

- 1) a) 5, 5 b) 8, 5 c) 5.66, 6.9 d) 7.73, 6.9 e) 52, 10
 f) 4.4, 1.1
 2) a) 40 b) If the mean is 5 then some of the scores have to be 5 or less, but they cannot be if the range is 5.
 A score of 5 would mean that the lowest score is 7
 3) 2.3 4) a) £44 b) £147 c) £49 5) a) 24 b) 9 and 3
 6) a) 21 b) 4 and 5 7) a) 153 b) 25 and 26 or 24 and 27

Mean and Range 2 - Page 84

- 1) a) 7 b) 7 c) 7 d) They are all the same
 2) a) 318 and 5 3) a) 76, 6 b) 427, 6 c) 2.9, 0.6
 d) 12.7 and 0.7 e) 34.5, 0.9

Rainfall - Page 85

- a) Cardiff b) July c) January
 d) Cardiff - because the bars are bigger
 e) 2.6cm f) Autumn g) West
 h) Both in Summer (both the same time of the year)

Restaurant Customers - Page 86

- a) Saturday b) 105 c) 77 d) 15 and 11
 e) Mid week - Tuesday and Wednesday in January
 f) Monday, Tuesday and Wednesday or Tuesday, Wednesday and Thursday g) 100

Computer Sales - Page 87

- a) 51 b) 51 c) £1000 d) £600 e) £1200
 f) (i) about £1031 (ii) about £640 g) £1200

Bicycle Prices - Page 88

- a) less than b) less than or equal to
 c) the number of times something occurs
 d) £50 or above but less than £100 e) five (count)
 f)

Price	Tally	Frequency
50 ≤ price < 100	///	3
100 ≤ price < 150	/	6
150 ≤ price < 200		13
200 ≤ price < 250		8
250 ≤ price < 300		2
Total		32

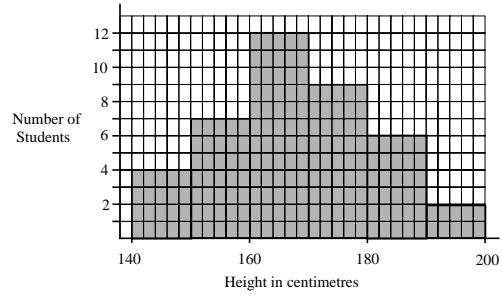
- g) 32 h) 3 i) 2 j) 6 k) 23 l) 9

Heights of Students - Page 89

a)

Height	Tally	Frequency
140 ≤ height < 150		4
150 ≤ height < 160		7
160 ≤ height < 170		12
170 ≤ height < 180		9
180 ≤ height < 190	/	6
190 ≤ height < 200		2
Total		40

b)



Travelling - Page 90

- a) 11:15 b) 3km c) B d) 15 minutes
 e) Because he travels fastest here (on his bike)
 f) 10:15 g) 10:30
 h) He walks faster in part C than in part D
 i) 10:53 j) 45 minutes k) 1 km l) 4km
 m) Part D. It is not as steep as the other parts indicating he is going slower

There and Back - Page 91

- a) 50 minutes b) 3.75km c) about 2 minutes d) 2.25km
 e) 20 minutes f) 10 minutes g) 1.75km
 h) Between posting the letter and the library i) 11:55
 j) 12:25 k) 12:05 l) 7.5 m) 2km

Percentage Bars 1 - Page 92

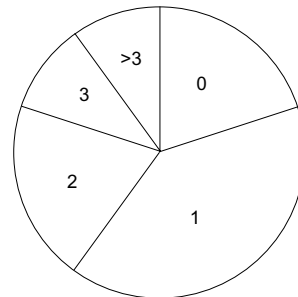
- a) Computers b) Printers c) Others d) About 9% and 21%
 e) 26% and 29% f) 200% g) About £125,000
 h) About £345,000 i) About 176% increase

Percentage Bars 2 - Page 93

- a) Polar Bears b) The Bats c) Penguins
 d) Penguins and the Bat House e) About 14.5%
 f) About 13.5% g) About 20.5% h) Lions
 i) This is true because the total number who went to the zoo in 2006 was greater than in 2003

Constructing a Pie Chart 1 - Page 94

Number of brothers and sisters	Number of students	Number as a percentage	Angle at the centre
0	40	20%	72°
1	80	40%	144°
2	40	20%	72°
3	20	10%	36°
More than 3	20	10%	36°

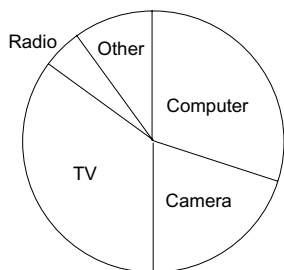


Constructing a Pie Chart 2 - Page 95

1) a)

Item	Percentage	Angle needed
Computer	30%	108°
Camera	20%	72°
TV	35%	126°
Radio	5%	18°
Others	10%	36°

b)



2) a)

Type of Film	Number Watched	Percentage of Total	Angle needed
Drama	30	18.75%	67.5°
Comedy	36	22.5%	81°
Musical	24	15%	54°
Fantasy	56	35%	126°
Others	14	8.75%	31.5°

b)



Comparing Pie Charts - Page 96

a) 30 - 49

- b) No. A bigger percentage but if lots more shop in the town centre then there could be more in the 70+ group
 c) More went to the town centre shop than the housing estate shop. d) between 240 and 250

Scatter Diagrams - Page 97

- 1) (i) Distance from the nearest service station
 (ii) Distance from home (iii) Distance from destination
 2) a) (ii) b) (iii) c) (i) (keep filling up) or (iii) d) (i) e) (ii) f) (i)

Probability 1 - Page 98

- 1) a) $\frac{1}{2}$ b) $\frac{1}{2}$ c) 5 d) 5 e) 25 f) 25
 2) a) $\frac{1}{6}$ b) $\frac{1}{6}$ c) 2 d) 2 e) 10 f) 10
 3) a) $\frac{10}{17}$ b) $\frac{1}{17}$ c) $\frac{1}{17}$ d) see below e) good f) the chance is $\frac{1}{14}$ which is even

Green Red

Probability 2 - Page 99

- a) yellow b) red or white c) yes d) yellow e) blue

f) because the same number of counters have been taken out g)



Probability 3 - Page 100

- 1) a) $\frac{4}{9}$ b) $\frac{5}{9}$ c) $\frac{4}{9}$ d) (i) 8 (ii) 3 (iii) $\frac{3}{8}$ e) $\frac{2}{5}$ f) yes if the one taken out is not replaced. If it is replaced the probability doesn't change
 2) $\frac{1}{6}$ b) $\frac{5}{6}$ c) $\frac{1}{6}$ d) no. The numbers on the dice don't change after they come up.
 3) a) $\frac{1}{4}$ b) $\frac{1}{4}$ c) $\frac{1}{2}$ d) $\frac{3}{4}$

Results Grid 1 - Page 101

- a) 0 - 1 b) 4 - 2 c) 8 d) 18 e) 20 f) Gives the total of the goals scored in a match. g)

	A	B	C	D	E
A		2	1	4	5
B	2		5	4	1
C	4	2		4	5
D	3	4	9		6
E	3	1	5	4	

h) 74

Results Grid 2 - Page 102

- a) 10 b) two 3 s c) two 1 s d) $\frac{1}{5}$, 0.2, 20%
 e) $\frac{1}{10}$, 0.1, 10% f) $\frac{1}{50}$, 0.14, 14%

Results Grid 3 - Page 103

a)

		Bag B			
		1	2	3	4
Bag A	1	1,1	1,2	1,3	1,4
	2	2,1	2,2	2,3	2,4
	3	3,1	3,2	3,3	3,4
	4	4,1	4,2	4,3	4,4

- b) yes c) $\frac{1}{16}$ d) $\frac{1}{16}$ e) 7 f) $\frac{1}{16}$ g)

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

- h) $\frac{3}{16}$ i) 5 j) 2 or 8

Combining Numbers - Page 104

- a) 321 b) 123, 132, 213, 231, 312, 321 c)

	1	2	3
1		12	13
2	21		23
3	31	32	

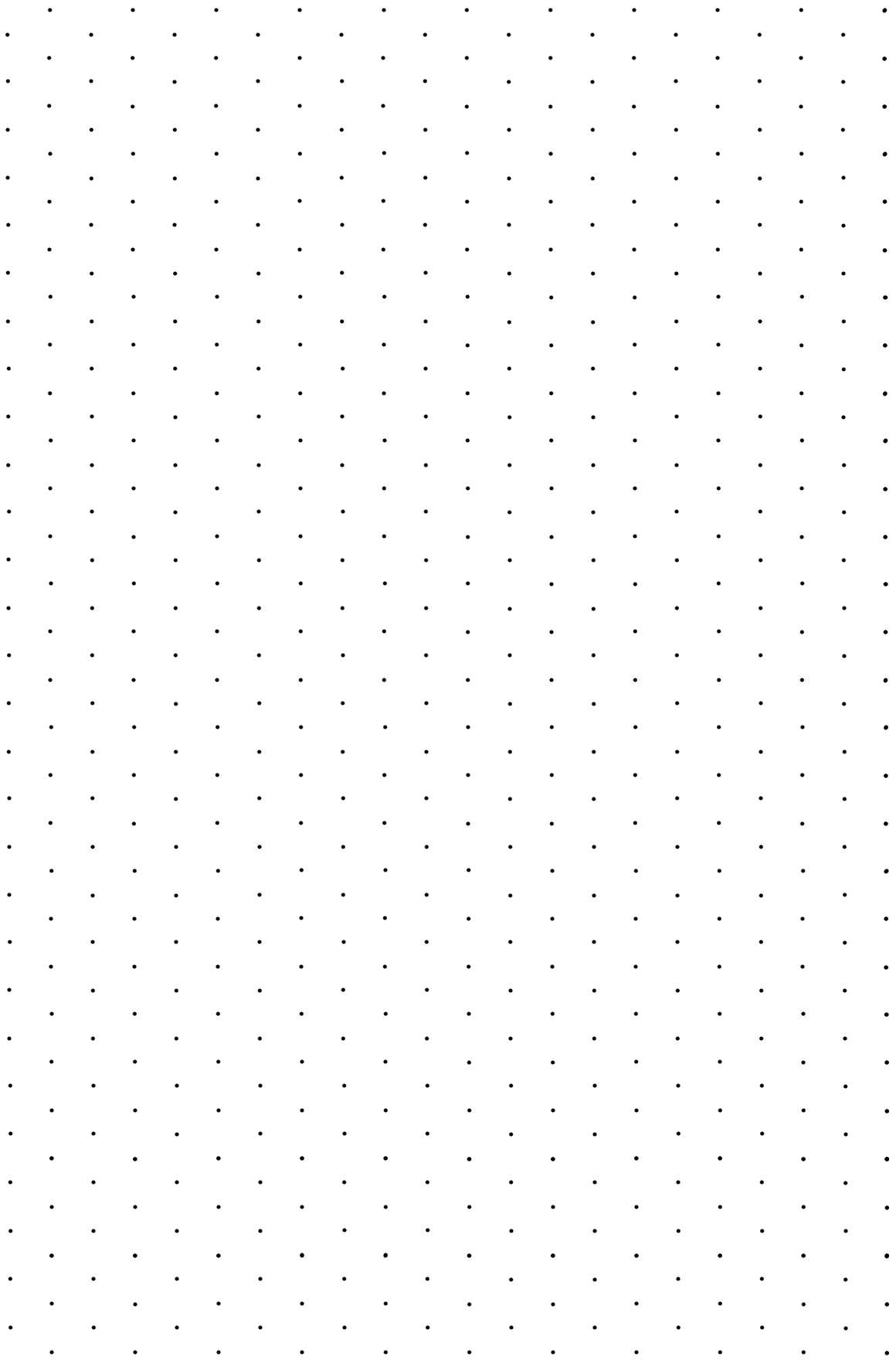
- d) 1234, 1243, 1324, 1342, 1423, 1432, 2134, 2143, 2314, 2341, 2413, 2431, 3124, 3142, 3214, 3241, 3412, 3421, 4123, 4132, 4213, 4231, 4312, 4321

e)

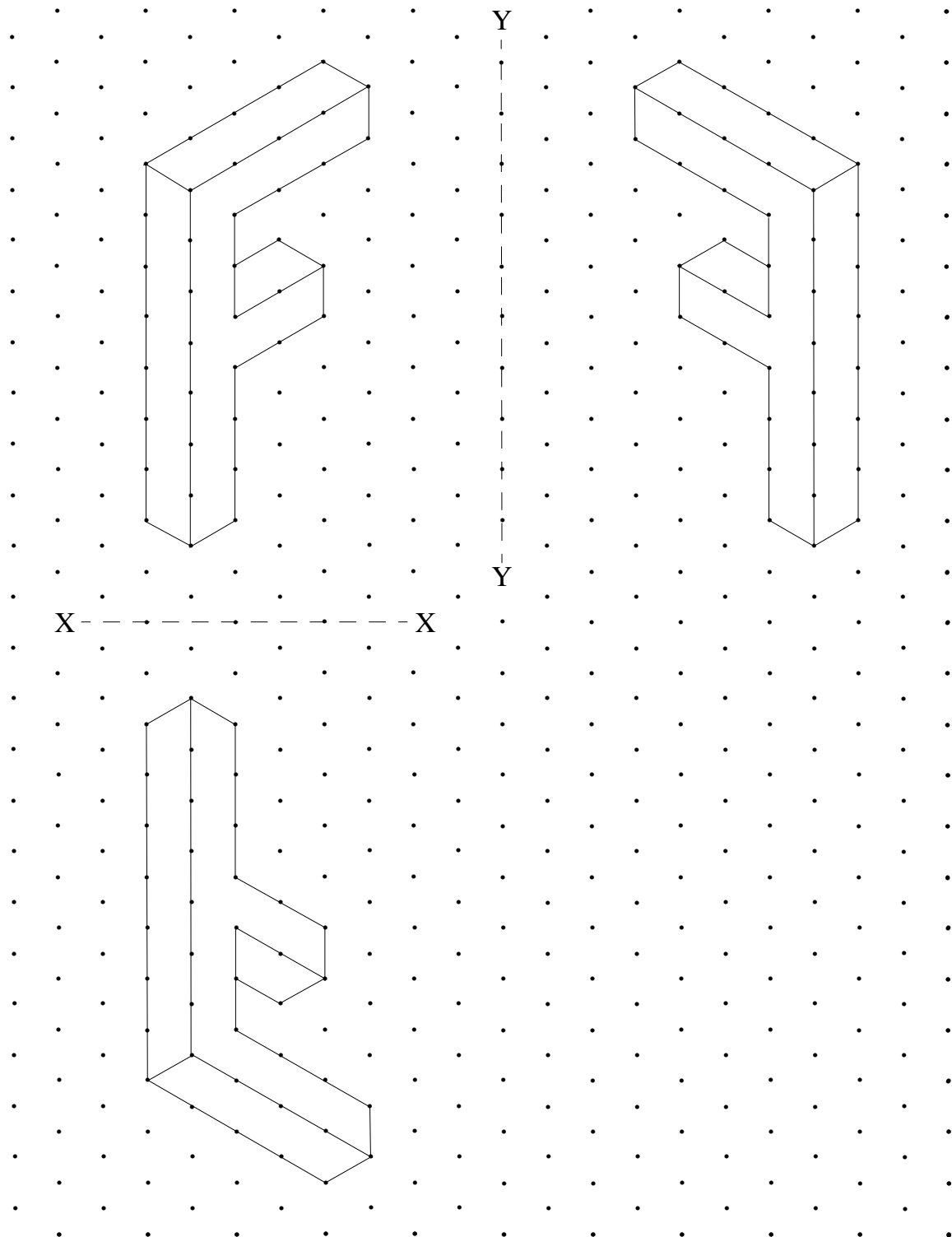
	1	2	3	4
1		12	13	14
2	21		23	24
3	31	32		34
4	41	42	43	

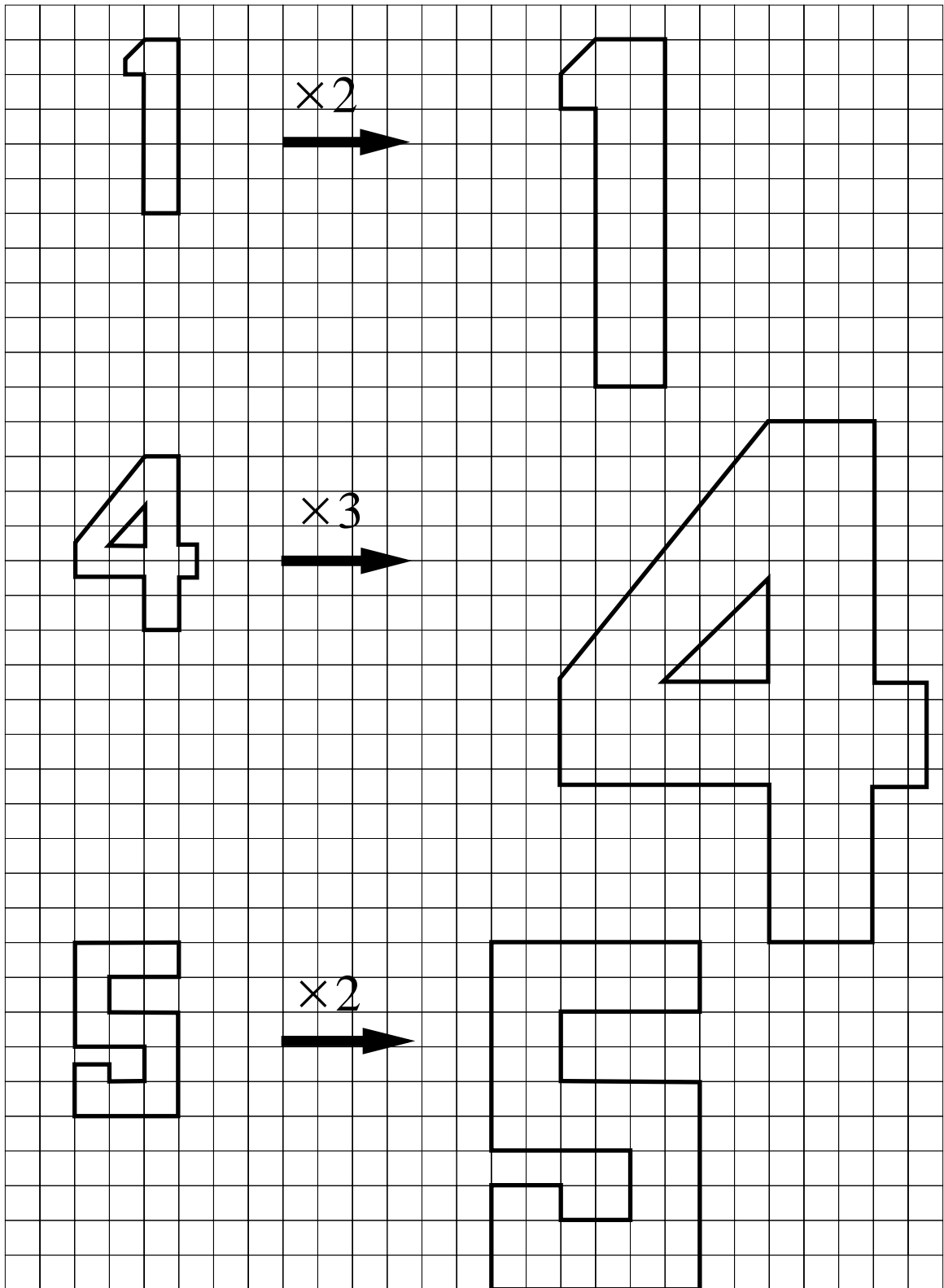
f) In a 5 x 5 grid there are 25 spaces. However 5 could not be used due to the numbers being the same. Therefore she would get 20 numbers. So she squares the number of cards then subtracts the number of cards.

g) (ii)

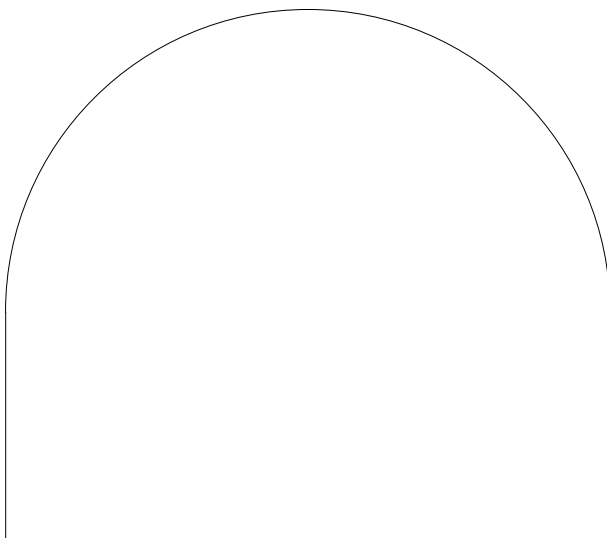
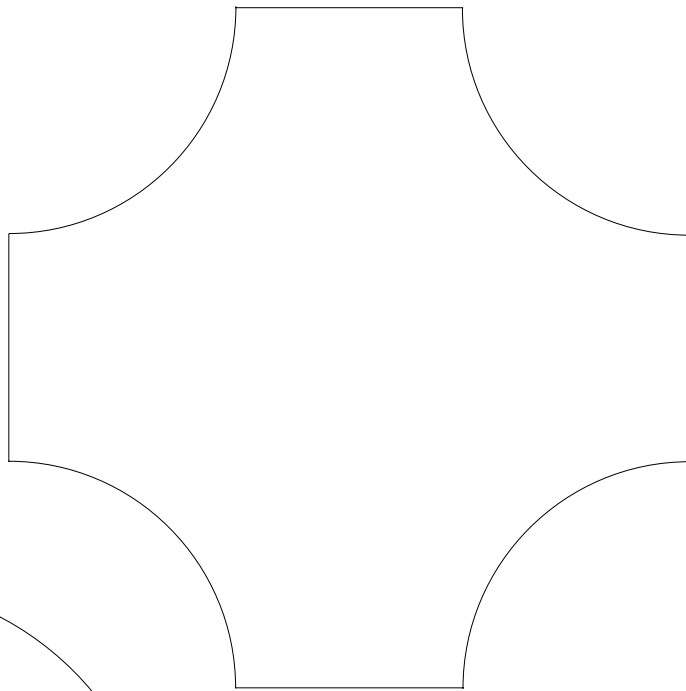
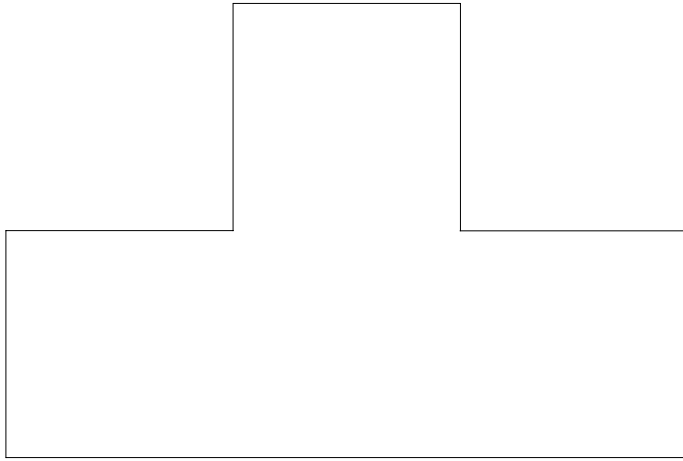


Answer





Answers to Drawings - Page 58



Answers to Drawings - Page 58

