

1

Experiment 1

- a) Toss two equal coins 20 times and note the outcomes in this table.

Outcome	Tally of 20 throws	Pupil Totals
H H		
H and T		
T T		

- b) Collect the data for the whole class and fill in the table.

Outcome	Class Totals	Relative frequency
H H		
H and T		
T T		
	$n =$	

- c) What do you notice about the results?

Write a sentence about it.

2

Experiment 2

- a) Toss three equal coins 40 times and note the outcomes in this table.

Outcome	Tally of 40 throws	Pupil Totals
H H H		
1 H and 2 T		
2 H and 1 T		
T T T		

- b) Collect the data for the whole class and fill in the table.

Outcome	Class Totals	Relative frequency
H H H		
1 H and 2 T		
2 H and 1 T		
T T T		
	$n =$	

- c) What do you notice about the results?

Write a sentence about it.

1

Throw two equal dice 72 times and write the data in the table.

Outcome	Tally of 72 throws	Pupil Total	Relative frequency	Class Total	Relative frequency
1 and 1					
1 and 2					
1 and 3					
1 and 4					
1 and 5					
1 and 6					
2 and 2					
2 and 3					
2 and 4					
2 and 5					
2 and 6					
3 and 3					
3 and 4					
3 and 5					
3 and 6					
4 and 4					
4 and 5					
4 and 6					
5 and 5					
5 and 6					
6 and 6					
$n =$		72	$n =$		

2

Using the class data in *Question 1*, fill in this table where we deal with the **sum** of the two numbers thrown.

Sum	0	1	2	3	4	5	6	7	8	9	10	11	12	13
Frequency														
Relative frequency														
Probability														

Calculations:

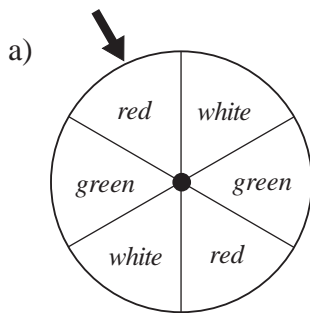
1

Using the class data in *Question 1* on page 142, fill in this table where we deal with the **product** of the numbers thrown. Calculate in your exercise book.

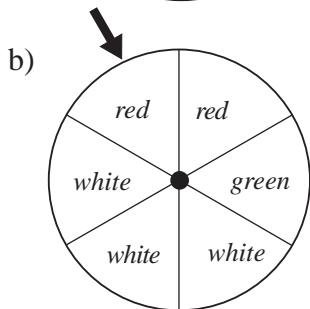
Product	1	2	3	4	5	6	8	9	10	12	15	16	18	20	24	25	30	36
Frequency																		
Relative frequency																		
Probability																		

2

What is the **probability** of these events happening?



- i) *Red* wins. ii) *Red or green* wins.
- iii) *Green* does **not** win.
- iv) Neither *green* **nor** *red* wins.



- i) *Red* wins. ii) *Red or green* wins.
- iii) *Green* does **not** win.
- iv) Neither *green* **nor** *red* wins.

3

A cuboid which measured 1.5 cm by 2 cm by 2.5 cm was used as a dice. The cuboid was thrown 1000 times and the frequency of each outcome was noted in the table.

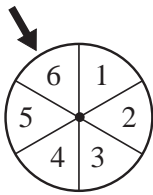
Outcome	Frequency	Relative frequency
1	145	
2	168	
3	189	
4	186	
5	162	
6	150	

- a) Calculate the **relative frequency** for each outcome and complete the table.
- b) If the sum of the numbers on any two opposite faces is 7, which numbers are written on the two:
- i) largest faces and
- ii) smallest faces? and

- c) What is the **relative frequency** of each of the 3 sizes of face?
- largest* *middle-sized* *smallest*
-

1

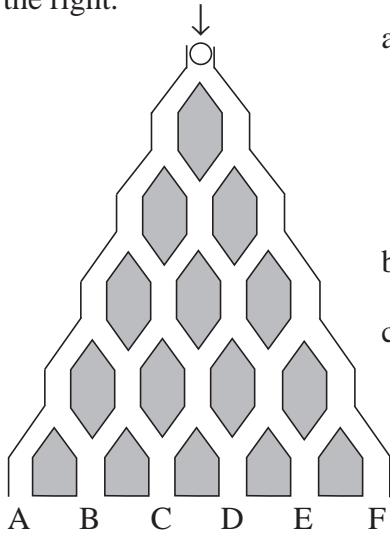
If the wheel is spun, what is the probability of these outcomes? Complete the table.



Outcome	1	2	3	4	5	6	At least 5	At most 5
Probability								

2

A marble is dropped into this maze and has an equal chance of falling to the left or to the right.



a) In how many ways can the marble come out at:

A B C
 D E F?

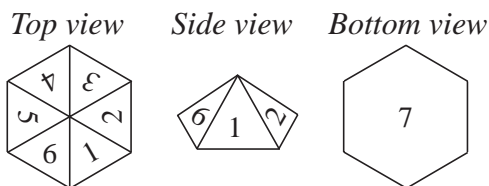
b) How many routes are there altogether?

c) What is the probability of each outcome?

Outcome	A	B	C	D	E	F
Probability						

3

Sue used this hexagon-based pyramid as a dice. It has 7 written on its hexagon base and 1, 2, 3, 4, 5 and 6 written on its triangular faces.



Sue threw the dice 100 times and noted the numbers it landed on. She wrote how many times (**frequency**) the dice landed on each number (**outcome**) in this table.

Outcome	1	2	3	4	5	6	7
Frequency	11	12	13	10	12	14	28
Relative frequency							

a) Fill in the bottom row of the table to show the **ratio** of the number of times a number was landed on to the total number of throws (**relative frequency**).

b) How many times did Sue throw: i) at least a 4
 ii) at most a 4?

1

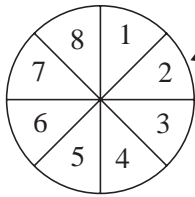
A bag of sweets contains 8 mints, 6 toffees and 2 boiled fruits, all wrapped in foil and all the same size and shape.

You take one sweet from the bag with your eyes closed. What is the probability that it is:

- a) a mint b) a toffee c) a boiled fruit
 d) **not** a mint e) **not** a toffee f) a mint **or** a toffee?

2

If the wheel is spun, what is the probability of each outcome? Complete the table.



Outcome	1	2	3	4	5	6	7	8	≥ 7	≤ 4	prime number
Probability											

3

A dice is thrown 100 times and a tally is kept of the numbers thrown.

The table shows the number of times (**frequency**) that each number (**outcome**) is thrown.

Outcome	1	2	3	4	5	6
Frequency	12	11	14	13	26	24
Relative frequency						

- a) Fill in the bottom row of the table to show the relative frequency.
- b) Do you think that the dice is **biased** or **unbiased**?
- Give a reason for your answer.
-
-

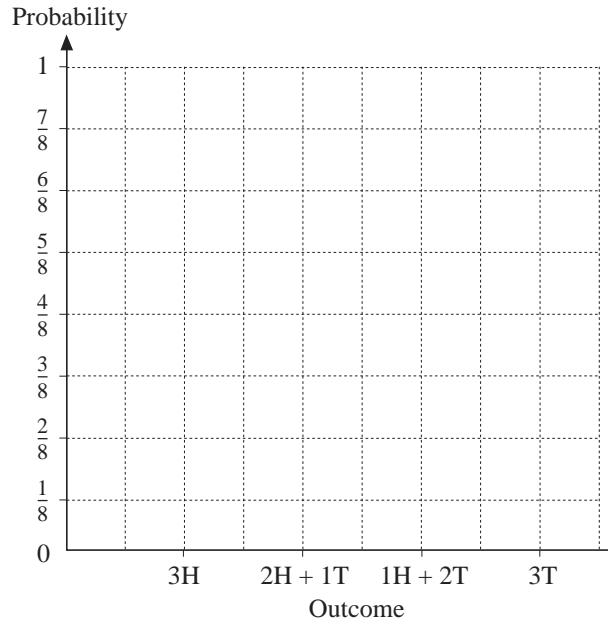
4

A bag contains 100 balls, each marked with a natural number from 1 to 100. You take out a ball with your eyes closed. What is the probability that it is:

- a) an even number b) a multiple of 3
 c) **not** a multiple of 3 d) a multiple of 10
 e) **not** a multiple of 10 f) a square number?

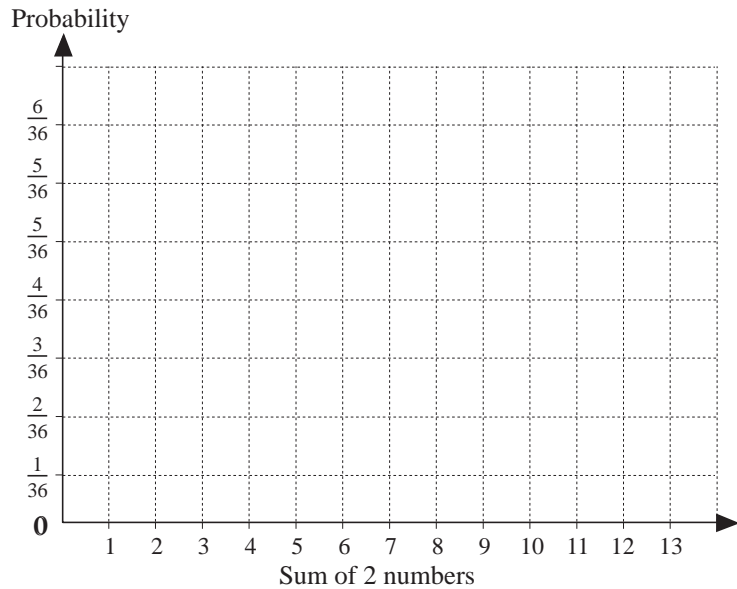
1

Three equal coins are tossed.
Draw a graph to show the probability of each outcome.



2

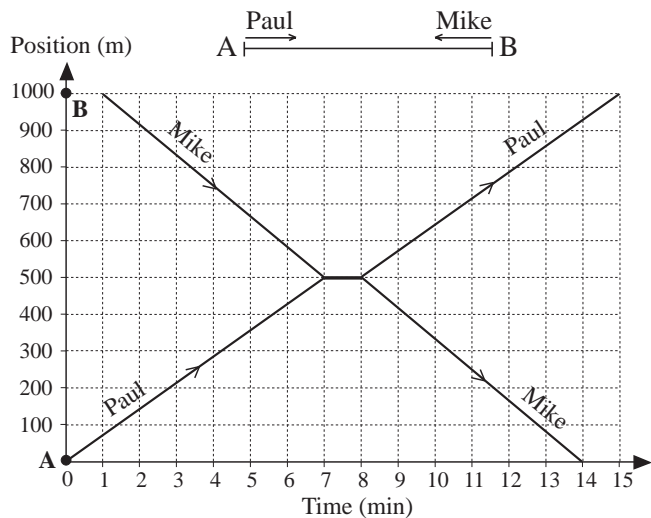
Two equal dice are thrown.
Draw a graph to show the probability of each possible **sum** of the two numbers thrown.
(Use the probability data from *Question 2*, page 142)



3

Paul is walking from A to B and Mike from B to A. The graph shows their positions during that time.

- a) Who started first?
- b) Who arrived first?
- c) How long did:
 - i) Paul take
 - ii) Mike take?
- d) What happened during the 7th and 8th minutes?
.....



1

Write in the table how many pupils in your class have birthdays in each month.

Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.

b) Show the data in a graph.

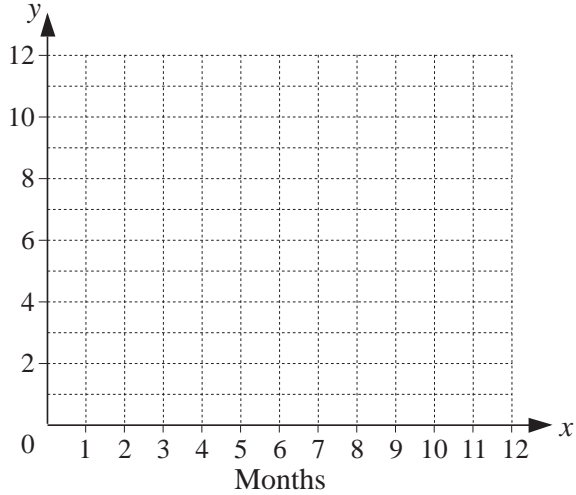
c) Write the data in increasing order.

.....

d) What are these values?

- i) Mode:
- ii) Median:
- iii) Mean:

Number of birthdays

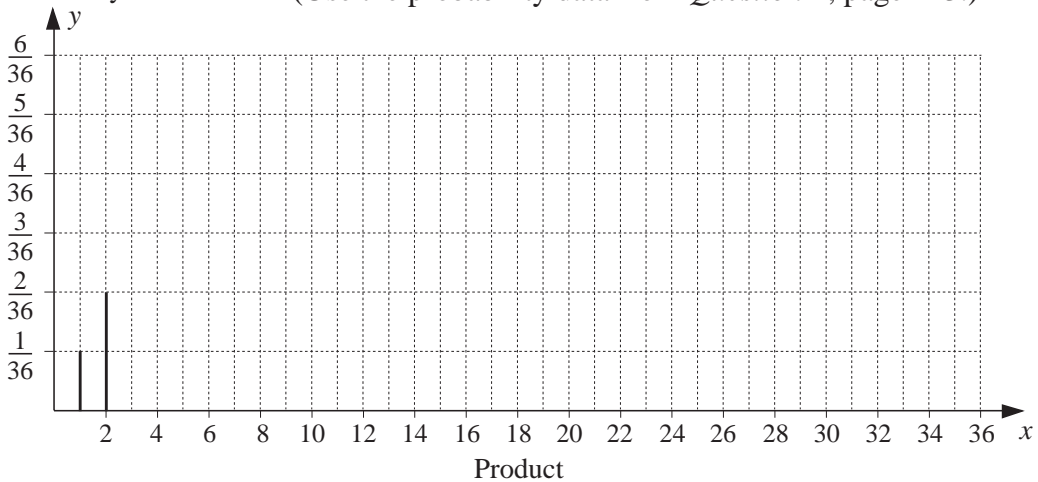


2

Show in a graph the probability of each possible **product** when 2 dice are thrown.

Probability

(Use the probability data from *Question 1*, page 143.)



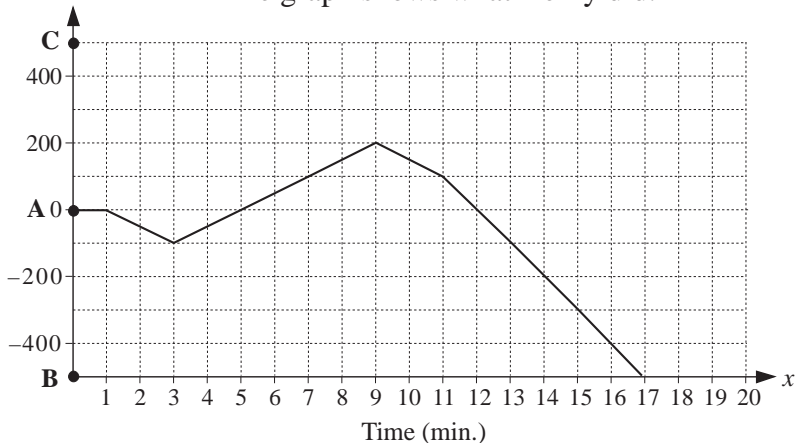
3

Henry cannot make up his mind which cinema, B or C, to go to from his house at A.

- a) Which cinema **did** Henry go to?
- b) When did he change his mind?
- c) When did he start to run?

Distance (m)

The graph shows what Henry did.



1

Two groups of pupils are in a competition to see which of them does better in a maths test out of 8 marks.

Both groups contain 8 pupils but their marks are similar. They need one overall mark for each group to make the comparison easier and decide to use the **mean** value.

Calculate the mean mark for each group and compare them. Fill in the missing sign.

Group A: 8, 8, 7, 5, 6, 8, 6, 7 (marks) **Group B:** 6, 6, 6, 7, 6, 7, 8, 8

Mean:

Mean:

2

Solve the problem in your exercise book and write the answer here.

Two groups of children collected blackberries. There were 6 children in **Group A** and 8 children in **Group B**.

The members of **Group A** collected these amounts of blackberries:

1.2 kg, 0.8 kg, 1.6 kg, 2.4 kg, 0.6 kg, 0.9 kg

The members of **Group B** collected these amounts of blackberries:

0.9 kg, 1.4 kg, 1.2 kg, 0.6 kg, 2 kg, 1 kg, 0.45 kg, 0.7 kg

Which group worked harder?

Answer:

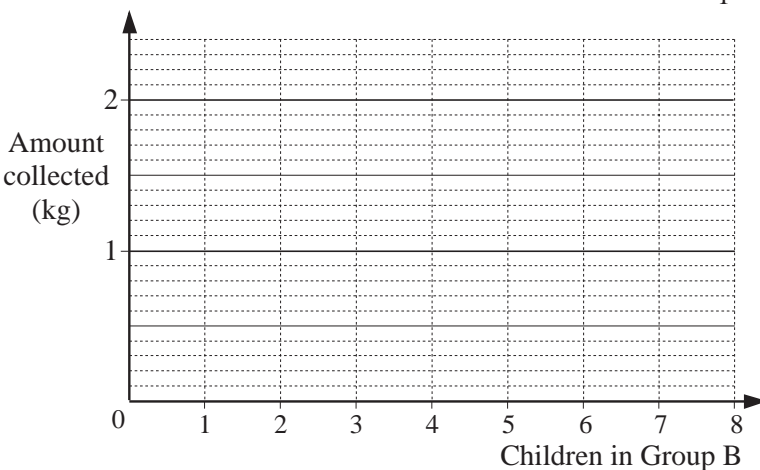
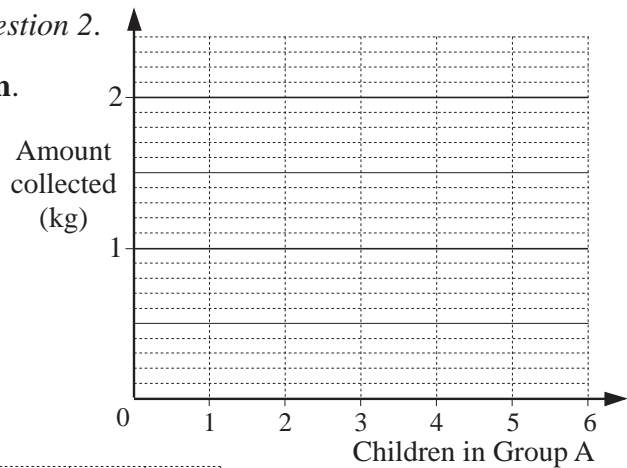
3

Draw graphs to show the data from *Question 2*.

Draw a *red* horizontal line at each **mean**.

Group A

Mean:



Group B

Mean:

1

The ages of the members of the *Cabbage* family are:

1 year, 3 years, 33 years, 34 years and 65 years

The ages of the members of the *Parsnip* family are:

10 years, 12 years, 19 years, 21 years, 42 years and 43 years.

a) Calculate the **mean** age of each family.

Cabbage family:

Parsnip family:

b) Both families are working in their gardens. Which family do you think will be able to do more work? Give a reason for your answer.

.....

2

One summer's day in Budapest, the temperature was noted every two hours and recorded in this table.

Time (hours)	0	2	4	6	8	10	12	14	16	18	20	22	24
Temperature (°C)	10.6	10.0	9.5	11.1	15.2	20.9	25.0	28.3	29.0	26.1	21.0	17.4	13.0

a) Calculate the **mean** of the temperatures on that day from the given data.

Mean:

b) Write the data in increasing order then find the **mode** and **median**.

.....

.....

Mode:

Median:

3

One winter's day in Budapest, the temperature was noted every two hours and recorded in this table.

Time (hours)	0	2	4	6	8	10	12	14	16	18	20	22	24
Temperature (°C)	-10	-11	-11	-10	-8	-3	1	4	5	2	0	-4	-8

a) Calculate the **mean** of the temperatures on that day from the given data.

Mean:

b) Write the data in increasing order then find the **mode** and **median**.

.....

.....

Mode:

Median:

1

Mike is growing two different varieties of tomato plants in his greenhouse.

During one week, he keeps a record of the number of tomatoes he picks from each type of plant and notes the data in a table.

Day	Mon	Tue	Wed	Thu	Fri	Sat	Sun
Variety A	5	5	4	1	0	2	5
Variety B	5	3	3	3	7	9	6

- a) For **Variety A**, what is the:
- i) mode ii) median iii) mean?
- b) For **Variety B**, what is the:
- i) mode ii) median iii) mean?
- c) Compare the two sets of data. Which variety do you think is best and why?

.....

.....

2

A group of pupils took tests in 4 subjects: English, Mathematics, History and Geography. Each test was out of 10 marks. The teacher wrote the results in this table.

	English	Mathematics	History	Geography	Mean mark per pupil
Anne	7	8	6	7	
Brenda	8	8	7	5	
Claire	9	10	9	8	
Darren	7	9	9	7	
Ella	10	9	5	8	
Freddy	8	10	6	5	
Graham	7	9	7	9	
Mean mark per subject					

- a) Complete the table by calculating: i) the mean mark per **pupil**
 ii) the mean mark per **subject**.
- b) Which pupil did best overall?
- c) Which subject did the pupils find: i) easiest
- ii) most difficult?

1

Calculator not allowed

KS2A
1999
Q.1Write in the **missing** numbers.

a) $(4 \times 3) + \square = 17$

[1 mark]

b) $(5 \times 5) - \square = 22$

[1 mark]

2

Calculator not allowed

KS2A
1999
Q.12Calculate 459×6

[1 mark]

3

Calculator allowed

KS2B
1999
Q.9Write the number that is the nearest to 5000 which uses **all** the digits 4, 5, 6 and 8.

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[1 mark]

4

Practise calculation.

a)

	2	0	8	1	7
		4	0	5	3
	1	0	4	1	0
+	5	0	5	0	5

b)

	2	2	0	8	1	7
-	6	7	0	9	2	

c)

	8	3	6	0	5
		×	1	4	
+					

5HMC
2002
Age 9

We have 80 books altogether. They are arranged on 3 shelves.

If we moved 7 books from the top shelf to the middle shelf and took 8 books away from the bottom shelf, there would be an equal number of books on each shelf.

How many books are on each shelf?

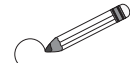
1

KS2B
1999
Q.2

Calculator allowed

Circle **two** numbers which add up to 160.

63	64	65	66	67
73	74	75	76	77
83	84	85	86	87
93	94	95	96	97



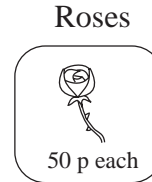
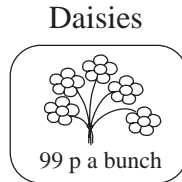
[1 mark]

2

KS2A
1999
Q.7

Calculator not allowed

A shop sells these flowers.



a) John buys **4 bunches of daisies**. How much does he pay altogether?

[1 mark]

b) Karpal has **£5.00** to spend on **roses**. How many **roses** can she buy for **£5.00**?

[1 mark]

3

a) $\frac{3}{4} + \frac{2}{4} + \frac{1}{4} =$

b) $2\frac{4}{5} - 1\frac{1}{5} =$

c) $3\frac{2}{3} + \frac{1}{6} =$

d) $\frac{7}{8} - \frac{1}{5} =$

e) $\frac{2}{7} \times 3 =$

f) $\frac{8}{9} \div 4 =$

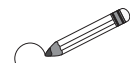
4

KS2A
1999
Q.18

Calculator not allowed

Circle the **two** numbers which add up to 1.

0.11 0.85 0.9 0.25 0.15



[1 mark]

5

a)

	1	0	2		
	1	0	3	4	5
+	6	2	9	7	

b)

	3	6	8	2
-	1	4	5	9

c)

	4	3
×	7	

d)

4	6	8
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6

HMC
2002, I
Age 10

	A	B
+	B	C
	D	A

In this addition, different letters stand for different digits and the same letters stand for the same digits. A is **not less** than 3.

a) Which digit could each letter stand for? Find different solutions in your exercise book.

b) What is: i) the smallest ii) the greatest possible sum?

1

Practise addition.

- a) i) $3 + 2 =$ ii) $3 + 0 =$ iii) $3 + (-2) =$
 iv) $3 + (-4) =$ v) $3 + (-6) =$
- b) i) $-3 + (-2) =$ ii) $-3 + 0 =$ iii) $-3 + 2 =$
 iv) $-3 + 4 =$ v) $-3 + 6 =$
- c) i) $25 + (-41) + 12 + (-10) =$
 ii) $-100 + (-30) + 78 + (-48) =$
 iii) $5000 + (-2000) + (-3000) =$
 iv) $-85\,000 + (-15\,000) + (-20\,000) =$
 v) $-236\,700 + 0 =$

2

Write an operation and calculate the answer.

- a) Ian had £1500 in cash and was £400 in debt, then £300 of his debt was cancelled. What is his balance now?

Balance:

- b) Lucy had £1500 in cash and was £400 in debt. She went on holiday and spent £1200. What is her balance now?

Balance:

3

Practise calculation.

- | | |
|-----------------------|-----------------------|
| a) i) $20 - (+14) =$ | b) i) $20 + (-14) =$ |
| ii) $20 - (+36) =$ | ii) $20 + (-36) =$ |
| iii) $40 - (+40) =$ | iii) $40 + (-40) =$ |
| iv) $35 - (-20) =$ | iv) $35 + (+20) =$ |
| v) $-30 - (-10) =$ | v) $-30 + (+10) =$ |
| vi) $-30 - (-30) =$ | vi) $-30 + (+30) =$ |
| vii) $-20 - (-50) =$ | vii) $-20 + (+50) =$ |
| viii) $-20 - (+30) =$ | viii) $-20 + (-30) =$ |

4

What is the smallest possible, 3-digit, positive integer which fulfils these conditions?

- If it is multiplied by 3, the result is also a 3-digit number.
- If it is multiplied by 4, the result is a 4-digit number.

1

Practise rounding:

- | | | |
|----------------------|-----------------------|-------------------------|
| a) to the nearest 10 | b) to the nearest 100 | c) to the nearest tenth |
| 6208 \approx | 6208 \approx | 62.08 \approx |
| 14 035 \approx | 14 035 \approx | 140.35 \approx |
| 90 455 \approx | 90 455 \approx | 904.55 \approx |
| 383 \approx | 383 \approx | 3.83 \approx |
| 9999 \approx | 9999 \approx | 99.99 \approx |

2

Calculator not allowed

KS2A
1999
Q.9Calculate $538 - 396$

[1 mark]

3

Calculator allowed

KS2B
1999
Q.5Write in the **four missing digits**.Put **one** digit in each box.

$$\boxed{}\boxed{} + \boxed{}\boxed{} = 198$$

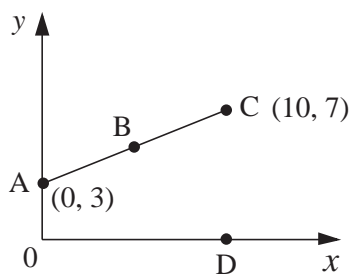
[1 mark]

4

Calculator not allowed

KS2A
1999
Q.20

Here is a graph.



- a) The points
- A**
- ,
- B**
- and
- C**
- are
- equally spaced**
- .

What are the **coordinates** of the point **B**?
$$\boxed{}, \boxed{}$$

[1 mark]

- b) Point
- D**
- is directly below point
- C**
- .

What are the **coordinates** of the point **D**?
$$\boxed{}, \boxed{}$$

[1 mark]

5HMC
2002, I
Age 10

In a race, the runners are started 1 minute after each other. The first runner covers 174 m each minute and the second runner covers 182 m each minute.

What distance will be between the two runners:

- a) 10 minutes after the first runner started
- b) 30 minutes after the first runner started?

1

Practise calculation.

a) $\frac{3}{5} + \frac{4}{5} + \frac{7}{10} =$

b) $\frac{3}{8} + \frac{1}{7} =$

c) $3\frac{3}{4} + \frac{3}{8} =$

d) $\frac{5}{7} - \frac{3}{7} =$

e) $1\frac{5}{6} - \frac{2}{3} =$

f) $\frac{7}{9} - \frac{1}{3} - \frac{1}{9} =$

2

Practise calculation.

a) $\frac{2}{3} \times 4 =$

b) $\frac{3}{4} \times 8 =$

c) $\frac{3}{8} \times 5 =$

d) $\frac{1}{3} \div 2 =$

e) $\frac{6}{7} \div 3 =$

f) $\frac{5}{9} \div 5 =$

3

a)

	3	7	0	2
1	4	9	4	
+	6	8	9	9

b)

7	8	3	9
-	4	9	5

c)

	2	7
×	9	

d)

6	4	5	0	6

4What is the largest possible, 3-digit, positive integer which fulfils **both** conditions?

- If it is multiplied by 3, the result is also a 3-digit number.
- If it is multiplied by 4, the result is a 4-digit number.

5

In a school the ratio of boys to girls in Year 5 is 5 : 7. There are 12 more girls than boys in Year 5. How many pupils are in Year 5?

 pupils**6**

What is the smallest possible natural number that has a remainder of 1 when divided by 2, 3, 4, 5 or 6 but which can be divided by 7 exactly?

7What are the four consecutive **odd** numbers which add up to 80?

1

Practise calculation.

- a) $37 - 80 + 43 + 64 - 44 =$
 b) $3.7 - 8 + 4.3 + 6.4 - 4.4 =$
 c) $5 \times 31 \times 25 \times 20 \times 4 =$
 d) $2 \times 50 \div 4 \times 27 =$

2

Practise calculation.

- a) $30 - 16 \div 4 + 9 \times 5 + 15 =$
 b) $72 \div 8 - 20 \times 6 \div 5 + 300 \div 100 =$
 c) $20 \div 8 \times 6 + 3 \times 12 \div 9 + 15 \div 5 - 5 =$

3

Do each calculation in two different ways.

- a) $650 - (450 + 120) =$
 or:
 b) $650 - (450 - 120) =$
 or:
 c) $50 \times (12 + 38) =$
 or:
 d) $(200 - 180) \times 7 =$
 or:
 e) $(90 + 72) \div 18 =$
 or:
 f) $600 \div (25 \times 6) =$
 or:

4

Which positive, whole numbers make all three inequalities true at the same time?

$$3 \times (5 + \square) < 35$$

$$8 + \square > 11$$

$$20 - 3 \times \square \leq 9$$

:

1

Calculator not allowed

KS2A
1999
Q.17Megan makes a sequence of numbers starting with **100**.She **subtracts 45** each time. Write the next **two** numbers in the sequence. [1 mark]100, 55, 10, , , [1 mark]**2**

Calculator not allowed

KS2A
1999
Q.16Eggs are put in **trays of 12**. The trays are packed in boxes.Each box contains **180 eggs**. How many trays are in each box?*Show your working. You may get a mark.* [2 marks]**3**

Calculator allowed

KS2B
1999
Q.19Calculate $\frac{7}{8}$ of 7000.

[1 mark]

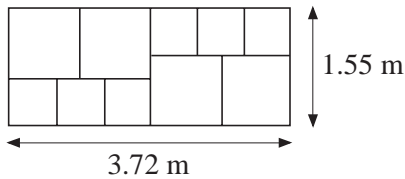
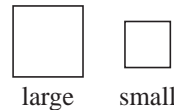
4

Calculator allowed

KS2B
1999
Q.21

Mr. Jones has two sizes of square paving stones.

He uses them to make a path.

The path measures **1.55 metres** by **3.72 metres**.Calculate the **width** of a **small paving stone**.*Show your method. You may get a mark.* [2 marks]**5**HMC
2002, II
Age 10

Solve the problem in your exercise book.

Some children and their Dads went on a journey by train. There were 10 Dads with 1 child each, 10 Dads with 2 children each and 10 Dads with 3 children each.

The group took up the 3 coaches at the front of the train and each child was in the same coach as his or her father.

How could they sit so that the number of Dads and the number of children were the same in each of the 3 coaches?

1Fill in the missing numbers and signs. $843 + 157 = 1000$

- a) $843 + (157 + 36) = 1000 + \square$ b) $843 + (157 + k) = 1000 \square k$
 c) $(843 + 41) + 157 = 1000 \square 41$ d) $(843 + n) + 157 = 1000 + \square$
 e) $843 + (157 - 69) = 1000 \square 69$ f) $843 + (157 - t) = 1000 - \square$
 g) $(843 - 55) + 157 = 1000 - \square$ h) $(843 - u) + 157 = 1000 \square u$
 i) $(843 + 16) + (157 + 16) = 1000 \square \square$
 j) $(843 + x) + (157 + x) = 1000 \square \square$
 k) $(843 + 72) + (157 - 72) = \square$ l) $(843 + y) + (157 - y) = \square$

2Fill in the missing numbers and signs. $685 - 185 = 500$

- a) $(685 + 15) - 185 = 500 + \square$ b) $(685 + a) - 185 = 500 \square a$
 c) $685 - (185 + 23) = 500 \square 23$ d) $685 - (185 + b) = 500 - \square$
 e) $(685 - 45) - 185 = 500 \square 45$ f) $(685 - c) - 185 = 500 \square c$
 g) $685 - (185 - 30) = 500 \square 30$ h) $685 - (185 - d) = 500 + \square$
 i) $(685 + 51) - (185 + 51) = \square$ j) $(685 + e) - (185 + e) = \square$
 k) $(685 + 4) - (185 - 4) = 500 \square \square$ l) $(685 + f) - (185 - f) = 500 \square \square$
 m) $(685 - 10) - (185 + 10) = 500 \square \square$
 n) $(685 - g) - (185 + g) = 500 \square \square$

3

Calculator allowed

Rakes
£7.70 eachSpades
£9.55 eachFlowerpots
£11.75 each

a)

Nicola has **£50**. She buys **3 flowerpots** and a **spade**.

How much money does she have left?

£ [2 marks]b) Seeds are **£1.49** for a packet. Stephen has **£10** to spend on seeds.What is the **greatest number** of packets he can buy? [1 mark]**4**

How many positive 3-digit numbers less than 500 are there in which the middle digit is half of the sum of the two outside digits?

KS2B
1999
Q.13HMC
2002, 1
Age 10

1Fill in the missing numbers and signs. $60 \times 20 = 1200$

- a) $(60 \times 3) \times 20 = 1200 \square 3$ b) $(60 \times n) \times 20 = 1200 \times \square$
 c) $60 \times (20 \times 4) = 1200 \square 4$ d) $60 \times (20 \times m) = 1200 \times \square$
 e) $(60 \div 3) \times 20 = 1200 \div \square$ f) $(60 \div s) \times 20 = 1200 \square s$
 g) $60 \times (20 \div 4) = 1200 \square 4$ h) $60 \times (20 \div t) = 1200 \div \square$
 i) $(60 \times 2) \times (20 \times 2) = 1200 \times \square$ j) $(60 \times u) \times (20 \times u) = 1200 \times \square$
 k) $(60 \div 4) \times (20 \div 4) = 1200 \div \square$ l) $(60 \div v) \times (20 \div v) = 1200 \div \square$
 m) $(60 \times 5) \times (20 \div 5) = \square$ n) $(60 \times a) \times (20 \div a) = \square$

2Fill in the missing numbers and signs. $1500 \div 30 = 50$

- a) $(1500 \times 2) \div 30 = 50 \times \square$ b) $(1500 \times a) \div 30 = 50 \square a$
 c) $1500 \div (30 \times 2) = 50 \square 2$ d) $1500 \div (30 \times a) = 50 \div \square$
 e) $(1500 \div 2) \div 30 = 50 \div \square$ f) $(1500 \div a) \div 30 = 50 \square a$
 g) $1500 \div (30 \div 2) = 50 \square 2$ h) $1500 \div (30 \div a) = 50 \times \square$
 i) $(1500 \times 2) \div (30 \div 2) = 50 \square \square$
 j) $(1500 \times a) \div (30 \div a) = 50 \square \square$
 k) $(1500 \div 2) \div (30 \times 2) = 50 \square \square$
 l) $(1500 \div a) \div (30 \times a) = 50 \square \square$
 m) $(1500 \times 2) \div (30 \times 2) = 50 \square \square$
 n) $(1500 \times a) \div (30 \times a) = 50 \square \square$
 o) $(1500 \div 2) \div (30 \div 2) = 50 \square \square$
 p) $(1500 \div a) \div (30 \div a) = 50 \square \square$

3

Calculator not allowed

KS2A
1999
Q.23Calculate 286×53 *Show your working.**You may get a mark.* [2 marks]**4**What is the greatest 3-digit natural number in which the **product** of its digits is 108?HMC
2002, II
Age 9

1

Do each calculation in two different ways.

a) $720 - (320 + 150) =$

or:

b) $720 - (320 - 150) =$

or:

c) $40 \times (11 + 29) =$

or:

d) $(300 - 270) \times 7 =$

or:

e) $(90 + 60) \div 15 =$

or:

f) $500 \div (20 \times 5) =$

or:

2

Compare the amounts. Fill in the missing signs. (<, > or =)

a) $\frac{1}{2}$ of 60 50% of 60

b) 40% of 50 m 20% of 100 m

c) $\frac{3}{4}$ of £100 70% of £100

d) 30% of 90 kg 20% of 150 kg

e) 20% of 5 km $\frac{2}{10}$ of 5 km

f) $\frac{3}{5}$ of £70 60% of £75

g) 75% of 2 litres 1.75 litres

h) $\frac{1}{10}$ of 42 km 0.42 km

i) 105% of 10 litres $1\frac{1}{5}$ of 10 litres 10.5 litres

3

What is the greatest 3-digit, natural number in which the product of its digits is 72?

Check:

4In a **magic square**, the sum of the numbers in each row, column and diagonal is the same. Complete these magic squares.

a)

	11	7
9		
	5	10

b)

10	3	
5		
	11	4

c)

14		12
10		8

1

KS2B
1999
Q.3

Calculator allowed

These are the times when letters are collected from a post box.

Monday to Friday	Saturday	Sunday
9 am 2 pm 6.30 pm	11.30 am	No collection

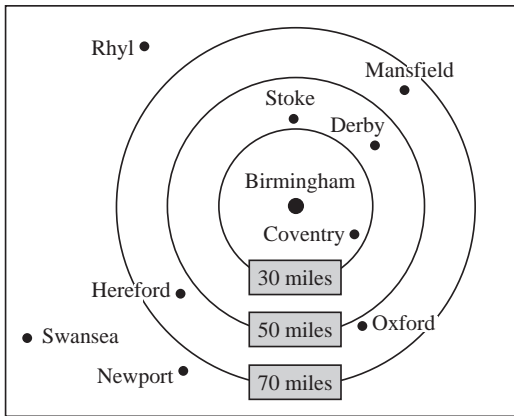
What is the **latest** time that letters are collected on **Wednesdays**? [1 mark]

Carla posts a letter at **10 a.m. on Monday**.
How **long** will it be before it is collected? hours [1 mark]

Gareth posts a letter on **Saturday at 4 p.m.**
When will it be collected from the post box? day time [1 mark]

2

KS2B
1999
Q.10



This diagram shows the distances of different towns from Birmingham.

Write the name of a town which is **between 30 and 50 miles** from Birmingham.
..... [1 mark]

Use the diagram to estimate the distance in **miles** from **Birmingham** to **Mansfield**.
 miles [1 mark]

3

KS2A
1999
Q.14

Calculator not allowed

Emma parks her car at **9.30 am**.
She collects the car at **1.20 pm**.
How much does she pay?
 [1 mark]

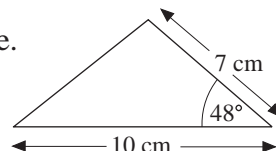
Car Park Charges	
Time	Charge
Up to 1 hour	20 p
1 to 2 hours	50 p
2 to 3 hours	£1.00
3 to 4 hours	£1.70
Over 4 hours	£5.00

Dan and Mark both use the car park.
Dan says, '*I paid exactly twice as much as Mark but I only stayed 10 minutes longer.*'
In your exercise book, explain how Dan could be correct. [1 mark]

4

KS2A
1999
Q.22

Here is a sketch of a triangle. It is not drawn to scale.
Draw the full size triangle **accurately**.
Use an angle measurer (**protractor**) and a ruler.

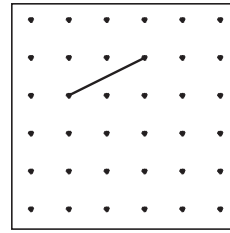


[2 marks]

1

KS2A
1999
Q.2

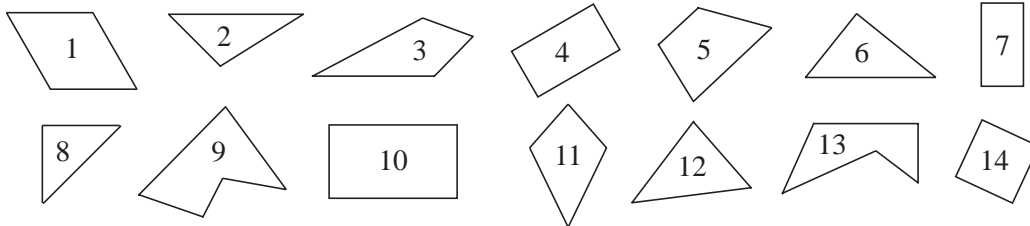
The line on the grid is one side of a square.
On the grid, draw the other three sides of the square.
Use a ruler.



[1 mark]

2

Group these plane shapes by listing their numbers.



Triangles

Quadrilaterals

Has at least 1 right angle

3

Decide whether the statements are *true* or *false*, then list their letters below.

- | | |
|---|--|
| a) All rectangles are quadrilaterals. | b) All quadrilaterals are rectangles. |
| c) Every quadrilateral is a rectangle but not every rectangle is a quadrilateral. | d) The diagonals of a rectangle are equal in length. |
| e) The adjacent sides of any rectangle are equal to each other. | f) The opposite sides of any rectangle are equal and parallel to each other. |
| g) Every trapezium has only 1 pair of parallel sides. | h) Every quadrilateral which has parallel sides is a trapezium. |
| i) All quadrilaterals with equal angles are rectangles. | j) There is a trapezium with equal sides which is not a rhombus. |

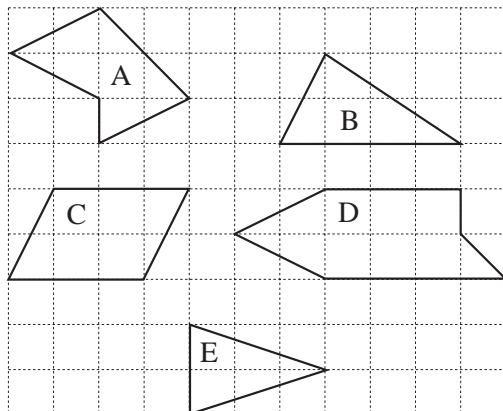
True:

False:

4

KS2B
1999
Q.6

Here are five shapes on a square grid.



Write in the **missing** letters.

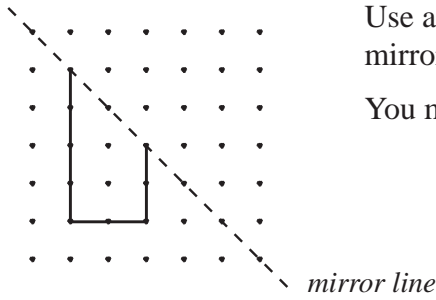
Shape has 2 pairs of parallel sides. [1 mark]

Shape is a pentagon. [1 mark]

Shape has reflective symmetry. [1 mark]

1

KS2A
1999
Q.8



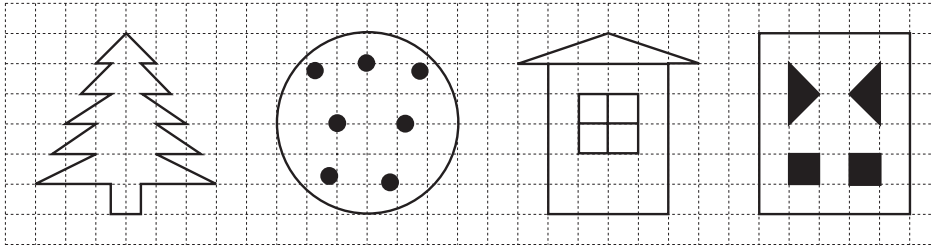
Use a ruler to draw the **reflection** of this shape in the mirror line.

You may use a mirror or tracing paper.

[2 marks]

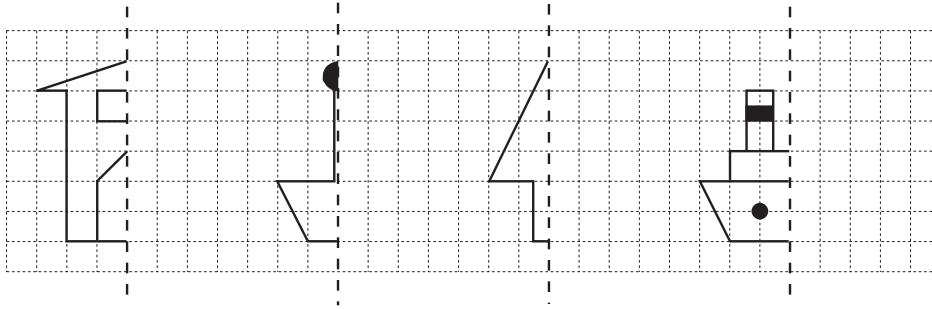
2

Draw mirror lines on the diagrams which have **reflective symmetry**.



3

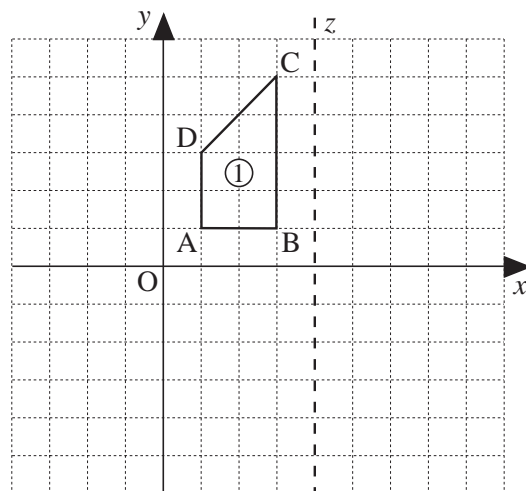
Draw the reflection of each shape in its mirror line.



4

Follow the instructions.

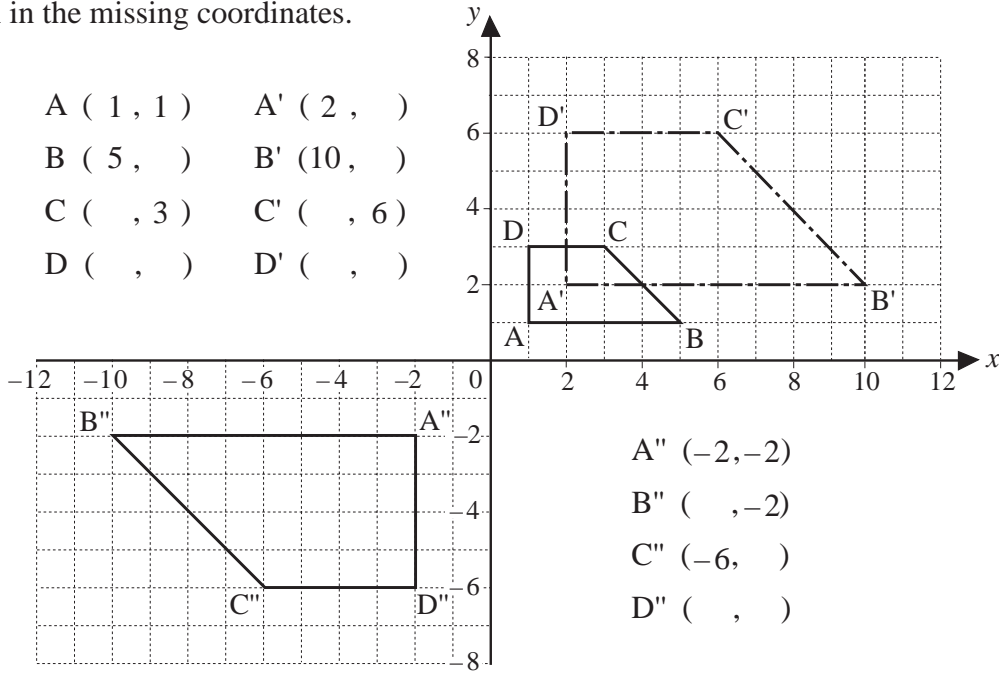
- Reflect** shape ① in the x axis.
Label it ②. Label the vertices A' , etc.
Write the coordinates of shapes ① and ② in your exercise book.
- Reflect** shape ② in the y axis.
Label it ③. Label the vertices A'' , etc.
Write its coordinates.
- Reflect** shape ② in line z .
Label it ④. Label the vertices A''' , etc.
Write its coordinates.
- Rotate** shape ① by 90° around point O .
Label it ⑤. Label the vertices A^* , etc.
Write its coordinates.



1

Fill in the missing coordinates.

- A (1 , 1) A' (2 ,)
 B (5 ,) B' (10 ,)
 C (, 3) C' (, 6)
 D (,) D' (,)



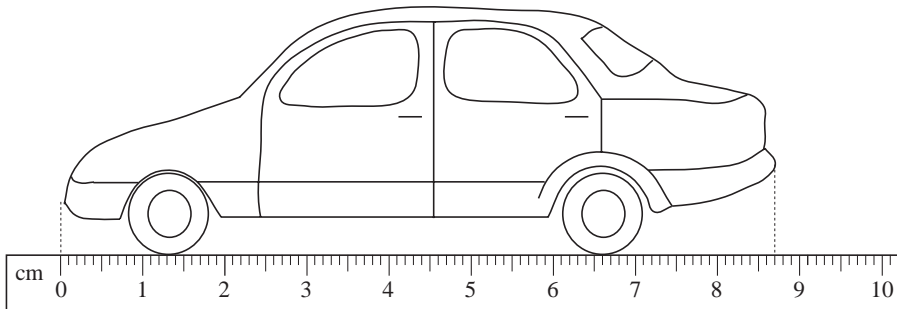
- A'' (-2, -2)
 B'' (, -2)
 C'' (-6,)
 D'' (,)

2

Calculator allowed

KS2B
 1999
 Q.14

Here is a drawing of a model car.



What is the **length** of the model? Give your answer in **centimetres**, correct to one decimal place.

cm [1 mark]

The height of the model is **2.9 centimetres**. The height of the real car is **50 times** the height of the model. What is the **height** of the **real car**? Give your answer in **metres**.

Show your **method**.

You may get a mark.

m [2 marks]

3

Solve the problem in your exercise book.

The lengths of the sides of a rectangle are whole centimetres. The perimeter of the rectangle is 20 cm.

- How many different such rectangles are possible? Give the length of their sides.
- Which of them has the smallest and greatest areas and what are these areas?

HMC
 2002, I
 Age 10

1

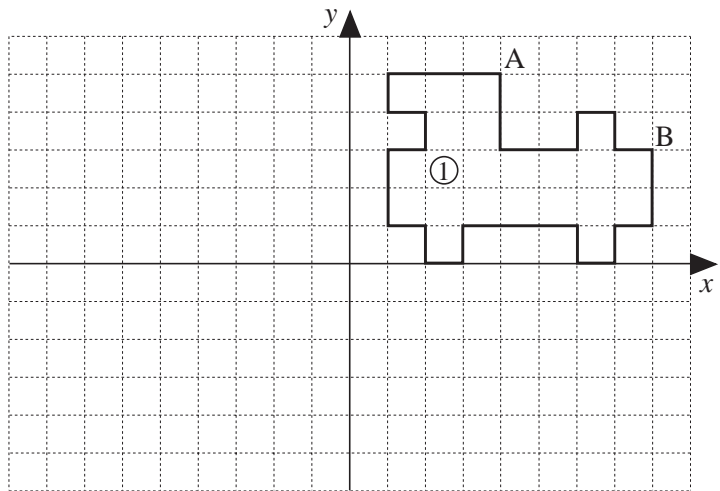
Decide whether the statements are *true* or *false*. Write T or F in the boxes.

- a) All squares are rectangles. b) All squares are parallelograms.
- c) The diagonals of any parallelogram are not equal in length.
- d) Every parallelogram which has perpendicular diagonals is a square.
- e) Not every parallelogram with equal sides is a square.
- f) A parallelogram with equal sides and equal angles is a square.

2

Follow these instructions.

- a) Write the coordinates of A and B.
A (,), B (,)
- b) **Reflect** shape ① in the y axis. Label it ②.
Label A' and B'.
Write their coordinates.
A' (,), B' (,)



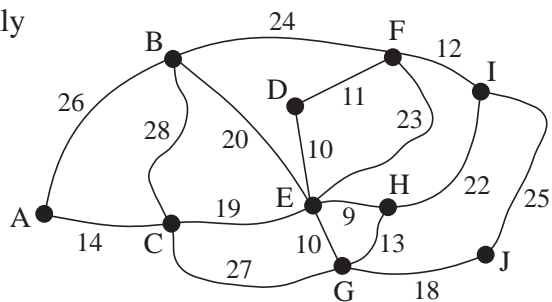
- c) **Reflect** shape ② in the x axis. Label it ③.
Label A'' and B''. Write their coordinates. A'' (,), B'' (,)
- d) Which single transformation will take shape ① to shape ③?
.....

3

A travelling salesman is planning his weekly trip to all the towns on this map.

On the map, the letters are the towns, the lines are the roads and the numbers are the distances in km between towns.

The salesman must start and finish at A and must visit every town at least once.



- a) Find a route for him and calculate its total distance.

Route:

Total distance:

- b) Find the route which has the **shortest** possible distance.

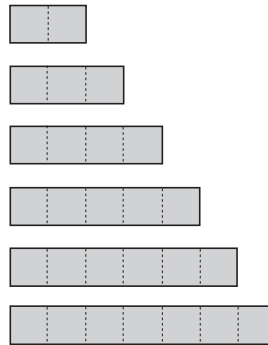
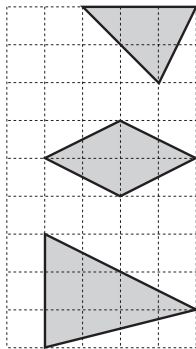
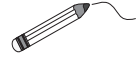
Route:

Total distance:

1

KS2A
1999
Q.5

Draw **one line** from each shape to the rectangle which has the **same area**.

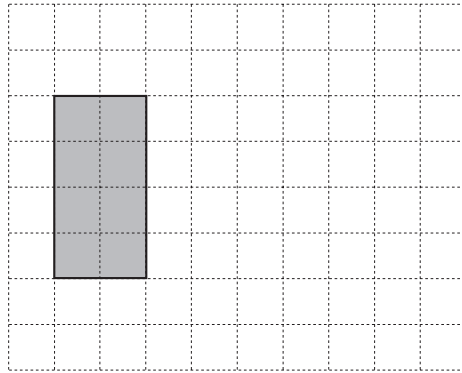


[2 marks]

2

KS2A
1999
Q.19

On the grid, draw a **triangle** which has the **same area** as the shaded rectangle.



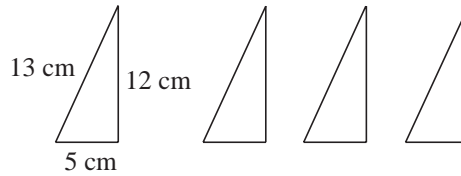
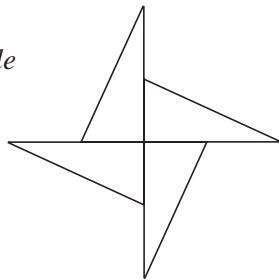
[1 mark]

3

KS2B
1999
Q.20

Lindy has 4 triangles, all the same size.
She uses them to make a star.

Not to scale



Calculate the **perimeter** of the star.
Show your method. You may get a mark.

cm [2 marks]

4

HMC
2002, II
Age 10

The numbers represented by the square must be even and greater than 6.
List all the numbers which make the inequality true.

$$24 < (\square \div 2 - 3) \times 2 < 50$$

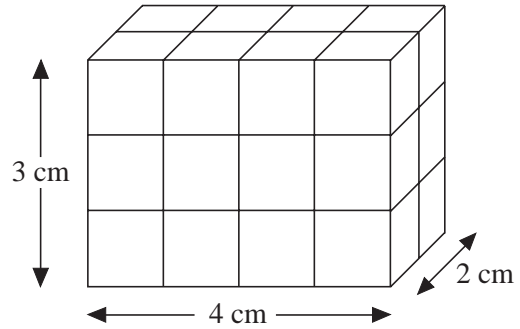
:

1

KS2A
1999
Q.13

Calculator not allowed

This cuboid is made from centimetre cubes.
It is 4 cm by 3 cm by 2 centimetres.



What is the **volume** of the cuboid?

cm³ [1 mark]

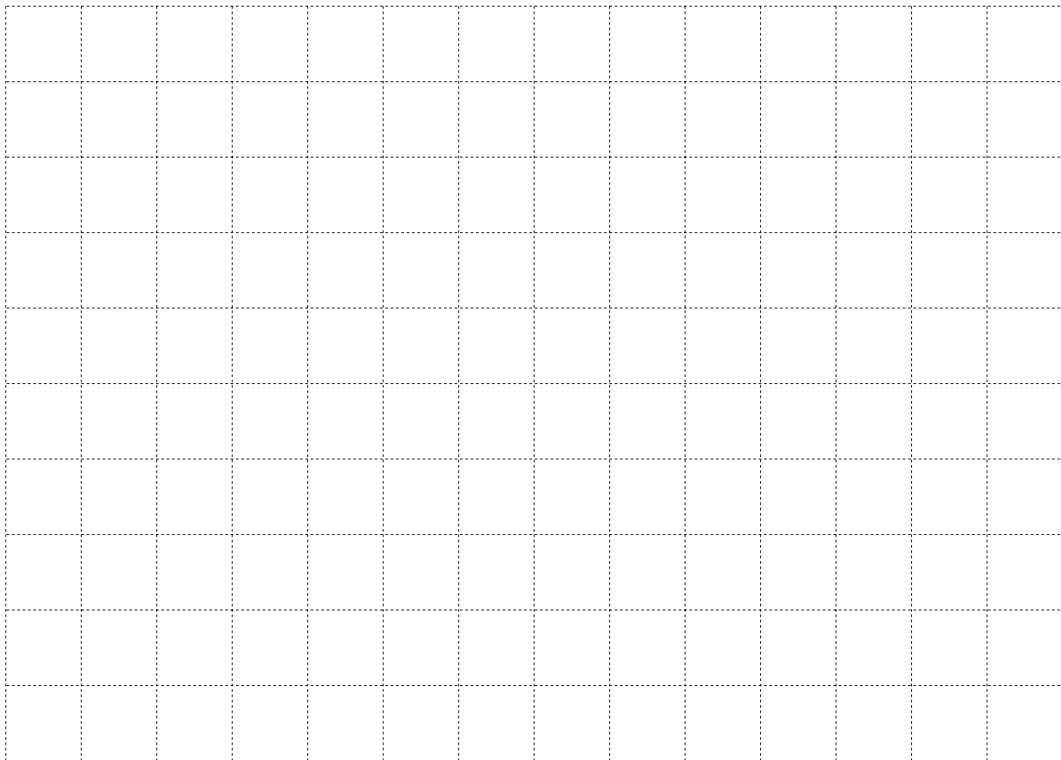
Another cuboid is made from centimetre cubes.
It has a volume of **30 cubic centimetres**.

What could the **length, height and width** be?

length: cm height: cm width: cm [1 mark]

2

a) Draw the net of a cuboid with sides 4 cm, 3 cm, and 2 cm.



b) Calculate its surface area.

3

HMC
2002, II
Age 10

Use each of the digits 0, 1, 2, 3, 4, 5, 6, 7, 8 and 9 **only once** to make **five** whole numbers, so that one number is twice, another number is three times, another number is four times and the last number is five times the smallest number.

1

KS2A
1999
Q.3

Calculator not allowed

This table shows the cost of sending a letter.

Paul is sending a letter.

It costs **38 p second class**.

How much would it cost him to send it **first class**?

p [1 mark]

Mass	Cost in pence	
	First class	Second class
Up to 60 g	26	20
61 g to 100 g	39	31
101 g to 150 g	49	38
151 g to 200 g	60	45
201 g to 250 g	70	55

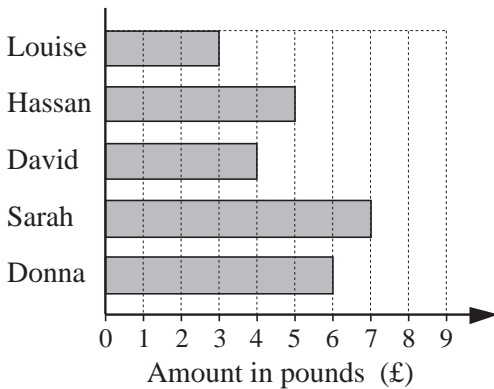
Jenny has a letter with a mass of **170 g**.
What does it cost to send it **first class**?

p [1 mark]

2

KS2A
1999
Q.10

Calculator not allowed



Five children collect money to plant trees.
Here is a bar chart of the amounts they have raised so far.

Their target is **£40 altogether**.

How much **more** money do they need to reach the target?

Show your **working** in your exercise book.

£ [2 marks]

3

KS2B
1999
Q.7

Calculator allowed

Tom, Amy and Helen want to go on a boat trip. There are three boats.



Lark 50 minute trip Tickets £2.75 each	Heron 70 minute trip Tickets £3.50 each	Kestrel 90 minute trip Tickets £4.20 each
--	---	---

How much does it cost altogether for **three people** to go on the **Lark**?



£ [1 mark]

Tom and Amy go on the **Heron**. They leave at **2.15 pm**.

At what **time** do they return?

pm [1 mark]

Helen goes on the **Kestrel** and gets back at **4.15 pm**.

At what time did the boat leave?



pm [1 mark]

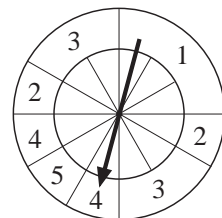
4

KS2A
1999
Q.21

The inner ring on this spinner is divided into 12 equal sections.

a) On which number is the pointer most likely to stop?
Explain your answer in your exercise book.

b) What is the probability of getting an even number?



1

Calculator not allowed

KS2A
1999
Q.6

Rob has some number cards. He holds up a card. He says,

'If I multiply the number on this card by 5, the answer is 35.'

What is the number on the card? [1 mark]

He holds up a different card. He says,

'If I divide the number on this card by 6, the answer is 4.'

What is the number on the card? [1 mark]

2

KS2B
1999
Q.8

August 1998

Sun	Mon	Tue	Wed	Thu	Fri	Sat
						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					

Here is the calendar for August 1998.

Simon's birthday is on **August 20th**.

In 1998 he had a party on the **Sunday** after his birthday.

What was the **date** of his party?

[1 mark]

Tina's birthday is on **September 9th**.

On what **day of the week** was her birthday in 1998? [1 mark]

3

Calculator allowed

KS2B
1999
Q.11

The **same** number is missing from each box. Write the **missing** numbers in the boxes.

× × = 1331 [1 mark]

4

Calculator not allowed

KS2A
1999
Q.11

Parveen buys **3 small bags of peanuts**. She gives the shopkeeper **£2** and gets **80 p change**. What is the cost in **pence** of **one** bag of peanuts?

Show your **working** in your exercise book.

p [2 marks]

5

Calculator allowed

KS2B
1999
Q.12

Kalid makes a sequence of numbers. The first number is 2. The last number is 18. His rule is to add the **same amount** each time. Write in the **missing** numbers.

2, , , , 18

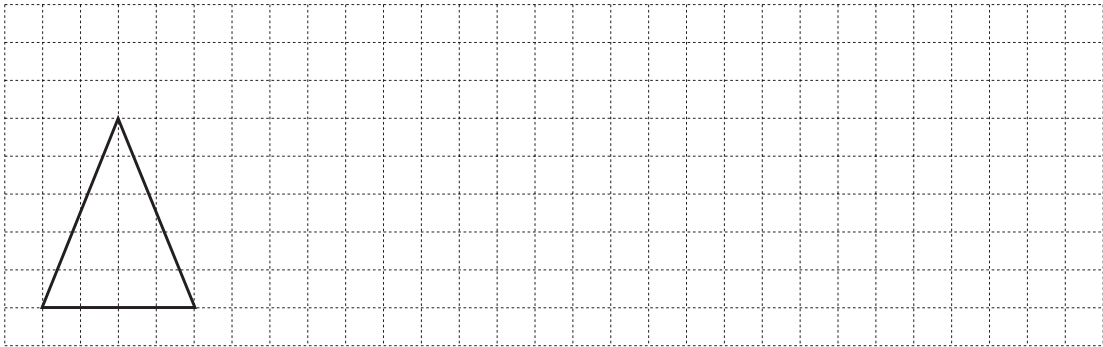
6

HMC
2002

In the year 2002, a man's age in years was equal to the sum of the digits of the year in which he was born. How old was he in 2002?

1

On the grid, draw 3 different rectangles which have the same area as the shaded triangle. Calculate the **perimeter** of each rectangle.



What are the lengths of the sides of the rectangle which has the shortest possible perimeter?

$a = \square \quad b = \square$

2


The numbers represented by the square must be a multiple of 3 and greater than 12. List all the natural numbers which make the inequality true.

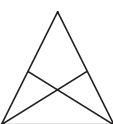
$$11 < (\square \div 3 - 4) \times 3 < 31$$

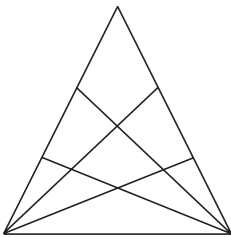
\square :

3

How many triangles can you see in each of these diagrams?

a)  triangles

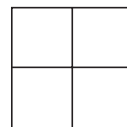
b)  triangles

c)  triangles

How many triangles do you think will be in the next triangle in the sequence? triangles

4

Which of the numbers 1 to 9 should be written in each square so that the **sum** of the four 2-digit numbers formed (two across and two down) is 67? (You may repeat a digit.)



5

Continue the sequence in both directions. Write the rule.

a) _____, _____, _____, 1.25, 6.25, 31.25, _____, _____, *Rule:*

b) _____, _____, _____, 0.27, 0.81, 2.43, _____, _____, *Rule:*

1

KS2B
1999
Q.4

Calculator allowed

Milly and Ryan play a number game: *What's my number?*

Milly	Ryan	
<i>Is it under 20?</i>	Yes	
<i>Is it a multiple of 3?</i>	Yes	
<i>Is it a multiple of 5?</i>	Yes	What is the number? <input type="text"/> [1 mark]

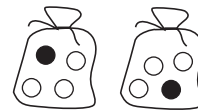
Milly and Ryan play the game again.

Ryan	Milly	
<i>Is it under 20?</i>	No	
<i>Is it under 25?</i>	Yes	
<i>Is it odd?</i>	Yes	
<i>Is it a prime number?</i>	Yes	What is the number? <input type="text"/> [1 mark]

2

KS2A
1999
Q.15

Here are two bags.



Each bag has **3 white balls** and **one black ball** in it.

A ball is taken from **one of the bags** without looking.

What is the probability that it is a **black ball**?

Give your answer as a fraction.

[1 mark]

All the balls from both bags are now mixed together in a new bag.

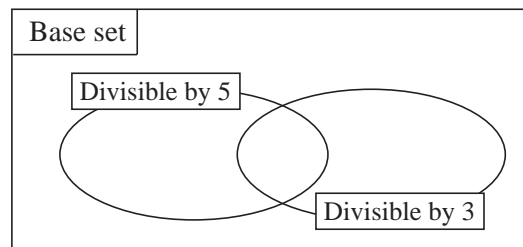
Put a **cross (x)** on this line to show the probability of taking a **black ball** from the new bag.



0 ————— 1 [1 mark]

3

Write the positive whole numbers which are not greater than 20 in the Venn diagram.



4

HMC
2002, 1
Age 9

List the whole numbers greater than 500 and less than 900 in which the digits are **increasing**. Try it out in your exercise book first.

.....

5

As 4

When we add two numbers from four natural numbers, the sums are: 3, 3, 4, 5, 6 and 6. What are the four numbers?

Extra questions

1

Factorise 172 and list its positive factors.

2

HMC
2002, II
Age 10

The digits of a 4-digit number greater than 5000 follow each other in increasing order. Another 4-digit number has those digits too, but in decreasing order.

A third 4-digit number has those digits too.

What are the three numbers if we know that their sum is 26352?

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3

HJA

We want to place 12 spotlights in the ceiling so that they are in 6 straight lines and there are 4 spotlights in each line. Draw different arrangements

4

HJA

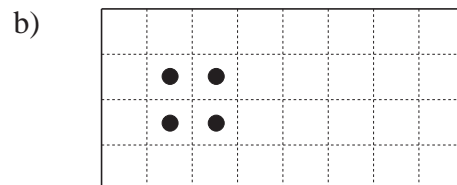
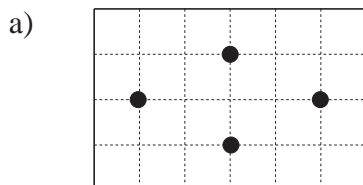
The edges of a cube are to be coloured either *red* or *blue* so that each face has at least one *red* edge. What is the **least** number of edges which should be coloured *red*?

Draw a diagram to show your answer.

5

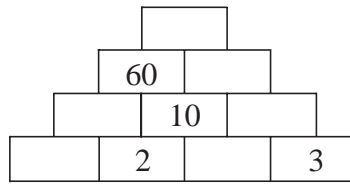
HJA

Each diagram is the map of a field in which there are 4 wells. Show how the field could be divided into 4 **congruent** parts so that each part has exactly one well.



1

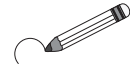
Fill in the missing numbers so that the product of any two **adjacent** numbers is the number directly above them.



2

KS2B
1999
Q.15

Sannir spins a **fair** coin and records the results.
In the first four spins, '**heads**' comes up each time.
Sannir says, '*A head is more likely than a tail.*'



Is he **correct**? Circle Yes or No.

YES / NO

[1 mark]

Give a reason for your answer.

[1 mark]

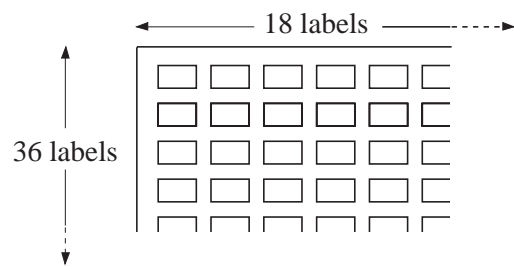
.....
.....

3

KS2B
1999
Q.16

Calculator allowed

A shop sells sheets of sticky labels.
On each sheet there are **36 rows** and **18 columns** of labels.



How many labels are there altogether in **45 sheets**?

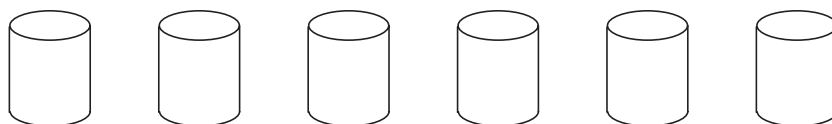
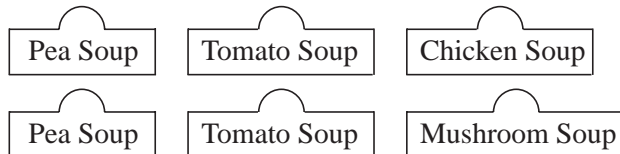
Show your **method**. You may get a mark.

[2 marks]

4

KS2B
1999
Q.18

Harry has **six** tins of soup.
The labels have fallen off.
Here are the labels and tins.



Harry chooses a tin.

What is the **probability** that it is a tin of **Pea Soup**?

[1 mark]

Give your answer as a fraction.

What is the **probability** that the tin he chooses is **not** a tin of **Tomato Soup**? Give your answer as a fraction.

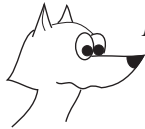
[1 mark]

1

Factorise 174 and list its positive factors.

2

HJA



Freddy Fox decided that from that day forward he would always tell the truth on Mondays, Wednesdays and Fridays but he would always tell lies on the other days of the week

One day he said, '*Tomorrow I will tell the truth.*'

On which day of the week do you think he said this?

3

HJA

Two barrels of equal size contain oil. One of the barrels is full and the other is half full. Their masses are 86 kg and 53 kg.

What is the mass of an empty barrel?

4

HJA

Andy, Betty, Cindy and Danny are walking down a mountain and need to go through a narrow, dark tunnel but have to overcome these difficulties.

- They have a torch which has only 12 minutes of power left.
- Andy is able to walk through the tunnel in 1 minute, Betty in 2 minutes, Cindy in 4 minutes and Doris in 5 minutes.
- They are all scared of the dark, so each of them will need the torch.
- The tunnel is so narrow that only 2 of them can walk through it at the same time.

Is it possible for them all to get through the tunnel? If so, how could they do it?

If not, why not?

5

HJA

Write the natural numbers from 1 to 9 into a 3 by 3 grid so that:

- the sum of the 3-digit numbers formed in the top and middle rows is equal to the 3-digit number in the bottom row;
- the sum of the 3-digit numbers formed in the left and middle columns is equal to the 3-digit number formed in the right column.

Trials:

1	<p>Use each of the natural numbers from 1 to 16 only once to form 8 pairs of numbers so that the sum of each pair is a square number.</p> <p>For example, (2, 14) is a possible pair, as $2 + 14 = 16 = 4 \times 4$</p> <p>(,), (,), (,), (,), (,), (,), (,), (,)</p>
2	<p>A group of boys and girls were all brothers and sisters from the same family.</p> <p>Each boy had as many sisters as he had brothers. Each girl had half as many sisters as she had brothers.</p> <p>How many girls and boys were in the group? Girls <input type="text"/> Boys <input type="text"/></p>
3	<p>A school had a class reunion. Five old friends, <i>Amy</i>, <i>Bill</i>, <i>Carrie</i>, <i>Dan</i> and <i>Eddie</i> met up again for the first time since they had left school and found out that:</p> <ul style="list-style-type: none"> • they lived in different countries: Finland, Greece, Holland, Ireland and Japan; • they had different jobs: engineer, lawyer, teacher, doctor and model; • one had 4 children, one had 3 children, one had 2 children, one had 1 child and one had no children. <p>During the conversation, they also found out that:</p> <ul style="list-style-type: none"> • The lawyer was living in Japan. • <i>Bill</i> was living in Greece and had 2 children. • <i>Amy</i> had no children. • The doctor lived in Finland and had some children. • <i>Dan</i> was an engineer living in Holland. • <i>Eddie</i> did not have 4 children. • <i>Carrie</i> was a model and had one child. <p>Use the information to answer these questions.</p> <p>a) How many children had the person living in Holland? <input style="width: 50px;" type="text"/></p> <p>b) Where was <i>Eddie</i> living?</p> <p>c) What was the name of the lawyer?</p> <p>d) How many children did the doctor have? <input style="width: 50px;" type="text"/></p> <p>e) What was <i>Bill's</i> job?</p>
4	<p>A lock on a safe needs a 6-letter code to open it. The code uses each of the letters A to F only once.</p> <p>Jim tried to guess the code. Here are his guesses.</p> <p>If we know that each of the 6 letters is in the correct place once in Jim's guesses and that the code starts with A, what is the code?</p> <p style="margin-left: 400px;"><i>Jim's guesses</i></p> <p style="margin-left: 400px;">CBADFE (1 letter is correct)</p> <p style="margin-left: 400px;">AEDCBF (2 letters are correct)</p> <p style="margin-left: 400px;">EDFACB (3 letters are correct)</p> <p style="margin-left: 400px;">Code: <input style="width: 150px;" type="text"/></p>