MathsWatch

PRIMARY

Years 4 to 6

Year 4

Year 5

Year 6

Year 4

Year 5

Year 6

Year 6

N1a Place Value - Integers

1) Put the following numbers in the place value table.

a) 2415
b) 607
c) 9380
d) 2004

1000 Thousands	100 Hundreds	10 Tens	1 Units

2) Write the following numbers in figures.

a) six hundred and sixty seven
b) two thousand one hundred and fifty six
c) nine hundred and fourteen
d) four thousand and seventy one

3) Write the following numbers in words.

a) 5432
b) 811
c) 3620
d) 9090

4) a) What is the value of the 2 in the number 1250?

b) What is the value of the 6 in the number 6924?

N1a Place Value - Integers

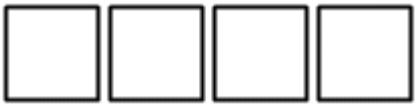
1) Match the words with the correct numbers.

twenty seven	2007
two hundred and seven	27
two thousand and seven	2070
two thousand and seventy	207

2) Here are four number cards.

a) What is the **biggest three digit** number you can make with these cards?

b) What is the **biggest even number** you can make with all four cards?



3) a) Write a whole number that is bigger than **one thousand** but smaller than **one thousand one hundred**.

b) Write the number **eleven thousand eleven hundred and eleven**.

N1b Place Value - Decimals

1) Put the following numbers in the place value table:
   a) 7.24
   b) 30.036
   c) 209.107
   d) 5034.005

Thousands	Hundreds	Tens	Units	.	Tenths	Hundredths	Thousandths

2) Write the following numbers in figures:
   a) Eight point two four
   b) Fifty point zero two five
   c) Three hundred and six point two
   d) Two thousand, five hundred and forty point zero seven

3) Write the following numbers in words:
   a) 7.5
   b) 80.26
   c) 930.074
   d) 1402.306

4) a) What is the value of the 4 in the number 72.46?
   b) What is the value of the 5 in the number 8.205?

N1c Place Value - Measures

m		cm	mm

1) Use the place value table to convert

   a) 2571 mm to cm

   b) 7 cm to mm

   c) 4 m to cm

   d) 324 mm to m

   e) 8 cm to m

L			mL

2) Use the place value table to convert

   a) 4052 ml to L

   b) 596 mL to L

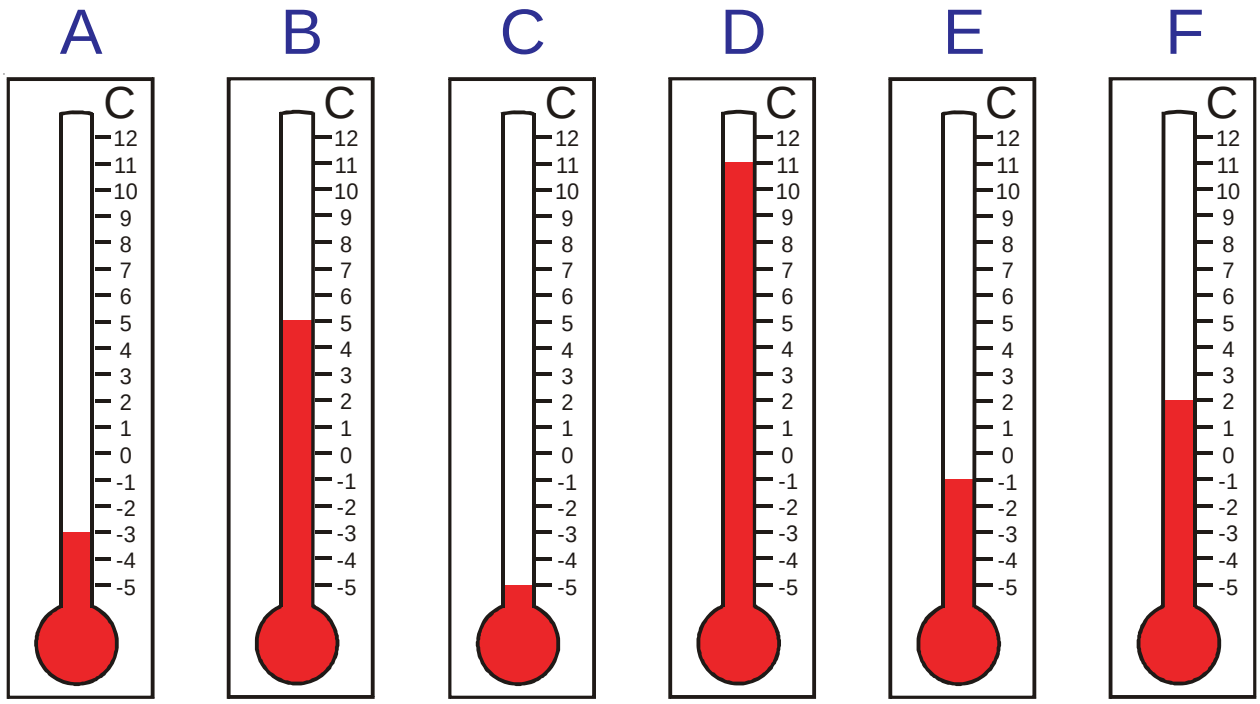
   c) 7 L to mL

   d) 8.4 L to mL

   e) 9.03 L to mL

N2a

Ordering Numbers - Integers



The thermometers A to F show the temperature at 3:00 A.M. in six different cities.
Use them to fill in the table below.
The first one has been done for you.

Thermometer	Temperature at 3.00 A.M	Temperature change over next five hours	Temperature at 8.00 A.M.
A	-3 °C	rises 8 °C	5 °C
B		falls 6 °C	
C		rises 3 °C	
D			-4 °C
E		rises 8.5 °C	
F			-4.5 °C

N2a Ordering Numbers - Integers

1) Place these numbers in order of size, smallest to largest.

a) 6, -1, 2, 5

b) 4, 7, -5, 3, -2

c) -1, -4, 0, 3, 9, -2

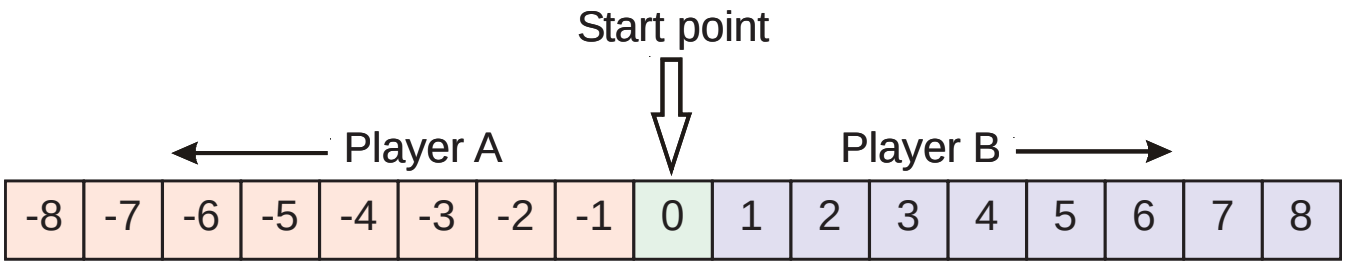
d) 1, -3, 4, -6, 8, -9, -4

e) -8, -4, -10, -6, -3, -7, -12

f) 6, 7.5, -3.5, -4, 8.5, -5.5, -2.5, -3

2) a) What is special about the temperature 100 °C?

b) What is special about the temperature 0 °C?



3) Place a counter on 0.

Player A and B take turns in rolling a dice.

Whatever scores player A gets, he/she always moves this many squares to the left.

Whatever scores player B gets, he/she always moves this many squares to the right.

Player A wins if he/she needs to move to a square which is less than -8.

Player B wins if he/she needs to move to a square which is more than 8.

N2b Ordering Numbers - Decimals

1) a) 0.47 b) 0.407 c) 7.04 d) 47.4

____ ____ ____ ____

From the following list, match the correct way of reading each of the above numbers.

A- seven point four
B- zero point forty seven
C- zero point four zero seven
D- four seven point four
E- seven point zero four
F- seven zero four
G- forty seven point four
H- four seven four
I- four seven point zero
J- zero point four seven

2) Arrange the numbers in order of size, starting with the smallest.

a) 1.8 0.8 8 8.1

___ ___ ___ ___

b) 0.08 1.16 0.12 1.09

___ ___ ___ ___

c) £4.04 £4.40 £4.14 £0.41

___ ___ ___ ___

d) 3.11 3.1 3 3.011 3.001

___ ___ ___ ___ ___

e) 0.2 0.022 0.202 0.222 0.22

___ ___ ___ ___ ___

f) 6.06 60.06 6.606 66.06 6.066

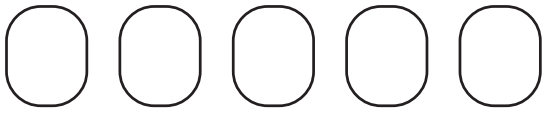
___ ___ ___ ___ ___

N2b Ordering Numbers - Decimals

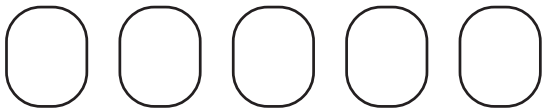
1) Here are some number cards.

Each card can be used once, all cards must be used,
the decimal point card cannot be at the end of a number.

a) What is the smallest number you can make?



b) What is the largest number you can make?



2) The times, in seconds, for the seven runners in a 100m race were:

9.96 10.03 9.92 10.26 10.37 9.99 10.00

What was the time of the winner? _____

3) I am a decimal number.
I have two figures before the decimal point and two figures after the decimal point.
I read the same forwards as backwards.
I have no zeros.
My first digit is bigger than my second digit.
The sum of my digits is 8.

What number am I? _____

N3a Adding Integers - Mentally

For each set of questions, time how long it takes to get the answers.
You must work out the answers in your head - *you can't do any working on paper.*

Set A

1) 23 + 35
2) 17 + 13
3) 45 + 46
4) 38 + 44
5) 71 + 54
6) 38 + 46
7) 27 + 68
8) 64 + 77
9) 64 + 99
10) 87 + 96

Set B

1) 42 + 56
2) 23 + 56
3) 37 + 25
4) 68 + 26
5) 83 + 65
6) 59 + 37
7) 42 + 39
8) 57 + 68
9) 99 + 48
10) 68 + 94

Set C

1) 62 + 24
2) 38 + 22
3) 17 + 34
4) 52 + 29
5) 82 + 63
6) 28 + 36
7) 88 + 17
8) 67 + 56
9) 42 + 98
10) 78 + 93

For any set of questions:

45 seconds or less:	Maths teacher standard
46 to 89 seconds:	Extremely fast
90 to 149 seconds:	Fast
150 to 209 seconds:	Reasonable
210 seconds or more:	A bit more practise needed

N3a Adding Integers - Mentally

This is a game for two people.

The player who goes first will say either 1 or 2, it is their choice.

The other player must now add on either 1 or 2 and say what the total is.

The first player now adds on 1 or 2 and says what the total is.

The game continues like this (always adding 1 or 2) until one of the players gets to 21.

The player who gets to 21 is the winner.

Here is a game between Ben and Sara as an example:

Ben goes first and says 2.
Sara adds 2 and says 4
Ben adds 1 and says 5
Sara adds 1 and says 6
Ben adds 2 and says 8
Sara adds 1 and says 9
Ben adds 2 and says 11
Sara adds 2 and says 13
Ben adds 2 and says 15
Sara adds 1 and says 16
Ben adds 2 and says 18
Sara adds 1 and says 19
Ben adds 2, **says 21 and wins**.

Play the game a few times and see if you can find any way of making sure you win.

If you go second, with the right tactics you can always win.

If you go first and the other person doesn't know the trick you can usually win as well.

N3b Adding Integers - Written Method

1) 51 + 36 = _____

2) 41 + 27 = _____

3) 231 + 25 = _____

4) 446 + 38 = _____

5) 569 + 84 = _____

6) 316 + 262 = _____

7) 596 + 472 = _____

8) 657 + 847 = _____

9) 62 + 38 + 517 = _____

10) 216 + 32 + 518 + 74 = _____

N3b Adding Integers - Written Method

Work out what the * must be.

1)
$$\begin{array}{r} 23 \\ +\ 4* \\ \hline 68 \\ \hline \end{array}$$

2)
$$\begin{array}{r} 58 \\ +\ 2* \\ \hline 84 \\ \hline \end{array}$$

3)
$$\begin{array}{r} 79 \\ +\ 4* \\ \hline 127 \\ \hline \end{array}$$

4)
$$\begin{array}{r} *3 \\ +\ 8* \\ \hline 160 \\ \hline \end{array}$$

5)
$$\begin{array}{r} ** \\ +\ *8 \\ \hline 192 \\ \hline \end{array}$$

6)
$$\begin{array}{r} 2*6 \\ +\ 35* \\ \hline 618 \\ \hline \end{array}$$

7)
$$\begin{array}{r} 4** \\ +\ *64 \\ \hline 751 \\ \hline \end{array}$$

8)
$$\begin{array}{r} *6* \\ +\ 4*6 \\ \hline 1363 \\ \hline \end{array}$$

N4a Subtracting Integers - Mentally

For each set of questions, time how long it takes to get the answers.
You must work out the answers in your head - *you can't do any working on paper.*

Set A

1) 75 – 71
2) 98 – 93
3) 84 – 32
4) 68 – 24
5) 79 – 47
6) 38 – 29
7) 67 – 48
8) 54 – 39
9) 94 – 36
10) 72 – 25

Set B

1) 57 – 52
2) 78 – 71
3) 56 – 13
4) 78 – 27
5) 66 – 31
6) 84 – 38
7) 76 – 29
8) 43 – 17
9) 62 – 26
10) 51 – 24

Set C

1) 39 – 34
2) 67 – 62
3) 83 – 42
4) 88 – 34
5) 76 – 25
6) 63 – 39
7) 46 – 28
8) 54 – 48
9) 72 – 27
10) 72 – 38

For any set of questions:

45 seconds or less:	Maths teacher standard
46 to 89 seconds:	Extremely fast
90 to 149 seconds:	Fast
150 to 209 seconds:	Reasonable
210 seconds or more:	A bit more practise needed

N4a Subtracting Integers - Mentally

This is a good trick.
This page tells you how to do the trick.
The next page gives you the secrets.

Let your friend see you writing on a piece of paper. Don't let them see what you are writing, though.

Fold the piece of paper to hide what you have written and place it on the table.

Now ask your friend to write a number where the first digit is bigger than the third digit.

Let's say they write 723.

Ask them to write the number back-to-front underneath the first number they wrote. →

$$\begin{array}{r} 723 \\ 327 \end{array}$$

Ask them to subtract the bottom number from the top. →

$$\begin{array}{r} 723 \\ -327 \\ \hline 396 \end{array}$$

Now tell them to write their answer back-to-front underneath it. →

$$\begin{array}{r} 723 \\ -327 \\ \hline 396 \\ 693 \end{array}$$

Now ask them to add the two numbers together. →

$$\begin{array}{r} 723 \\ -327 \\ \hline 396 \\ +693 \\ \hline 1089 \end{array}$$

Tell them to unfold the paper on the desk.

They will find that you correctly predicted their final answer.

N4b Subtracting Integers - Written Method

1) 35 – 12 = _____

2) 58 – 27 = _____

3) 93 – 46 = _____

4) 258 – 37 = _____

5) 681 – 79 = _____

6) 420 – 68 = _____

7) 743 – 471 = _____

8) 361 – 278 = _____

9) 800 – 692 = _____

10) 1450 – 785 = _____

N4b Subtracting Integers - Written Method

Work out what the * must be.

1)
$$\begin{array}{r} 45 \\ -\ 2* \\ \hline *2 \\ \hline \end{array}$$

2)
$$\begin{array}{r} 79 \\ -\ *5 \\ \hline 3* \\ \hline \end{array}$$

3)
$$\begin{array}{r} 67 \\ -\ ** \\ \hline 41 \\ \hline \end{array}$$

4)
$$\begin{array}{r} ** \\ -\ 61 \\ \hline 25 \\ \hline \end{array}$$

5)
$$\begin{array}{r} 63 \\ -\ ** \\ \hline 16 \\ \hline \end{array}$$

6)
$$\begin{array}{r} 3*5 \\ -\ 26* \\ \hline 82 \\ \hline \end{array}$$

7)
$$\begin{array}{r} 9** \\ -\ *63 \\ \hline 565 \\ \hline \end{array}$$

8)
$$\begin{array}{r} *** \\ -\ 596 \\ \hline 187 \\ \hline \end{array}$$

N5 Multiplication by 2, 3, 4, 5, and 10

1) Fill in the missing numbers in the minitables below.

a)

×	10	4	5	3
3				
2		8		
1				3
5			25	

b)

×	5		4	2
2				
4		12		
				20
3				

2) Work out

a) 2 × 17 = ____ b) 24 × 5 = ____

c) 10 × 9 = ____ d) 4 × 62 = ____

e) 37 × 3 = ____ f) 2 × 81 = ____

g) 5 × 32 = ____ h) 3 × 19 = ____

i) 26 × 4 = ____ j) 11 × 10 = ____

N5 Multiplication by 2, 3, 4, 5, and 10

1) a) **Use the table** to fill in the gaps below.

21 × 14 = ____

12 × ____ = 228

____ × 15 = 315

286 ÷ 22 = ____

×	**11**	**12**	**13**	**14**	**15**
18	198	216	234	252	270
19	209	228	247	266	285
20	220	240	260	280	300
21	231	252	273	294	315
22	242	264	286	308	330

b) Give two **different** pairs of numbers.

____ × ____ = 252

____ × ____ = 252

2) Julia says:

"*Multiply any number by five.*
The answer must be an odd number."

Is she correct?
Circle **Yes** or **No**

Yes / No

Explain how you know.

_____

N6 Division by 2, 3, 4, 5, and 10

1) Work out

a) 16 ÷ 2 = ____ b) 30 ÷ 5 = ____

c) 21 ÷ 3 = ____ d) 40 ÷ 4 = ____

e) 35 ÷ ____ = 7 f) 24 ÷ ____ = 8

2) Work out

a) 46 ÷ 2 = ____ b) 39 ÷ 3 = ____

c) 65 ÷ 5 = ____ d) 62 ÷ 4 = ____

e) 47 ÷ 3 = ____ f) 11 ÷ 10 = ____

g) 92 ÷ 4 = ____ h) 57 ÷ 3 = ____

i) 90 ÷ 5 = ____ j) 83 ÷ 10 = ____

N6

Division by 2, 3, 4, 5, and 10

1) Here is part of the 45 times table.
Use the table to help you fill in the missing numbers.

a) 315 ÷ 7 = _____

b) 135 ÷ 45 = _____

c) 270 ÷ _____ = 45

d) _____ × 45 = 405

e) 495 ÷ 45 = _____

f) _____ × 45 = 900

g) 450 ÷ 30 = _____

1 × 45	=	45
2 × 45	=	90
3 × 45	=	135
4 × 45	=	180
5 × 45	=	225
6 × 45	=	270
7 × 45	=	315
8 × 45	=	360
9 × 45	=	405
10 × 45	=	450

2) Joe says:

"*Divide any number by three.*
The answer must be an even number."

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

Yes / No

Explain how you know.

_____

N7a Units
Length, Mass and Capacity

1) a) How many millimetres are in a centimetre?

b) How many centimetres are in a metre?

c) How many metres are in a kilometre?

d) Work out how many millimetres are in a metre.

2) How many grams are in three kilograms?

3) How many millilitres are in a five litres?

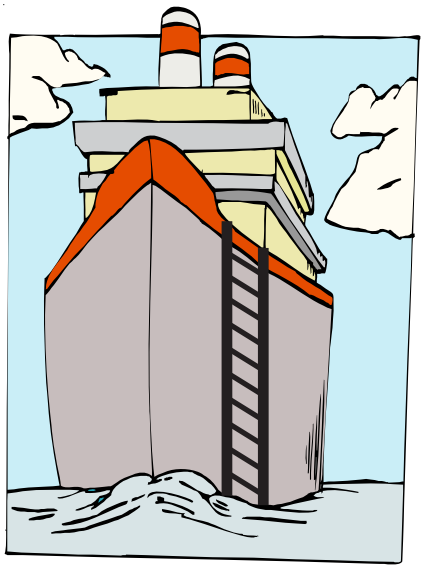
4) In the table, work out what each item should be measured in.
Your choices are mm, cm, m, km, g, kg, ml or l.

Amount of lemonade in a bottle	
Mass of a lemonade bottle	
Width of a lemonade bottle	
Distance to the moon	
Mass of a wasp	
Length of a wasp	
Amount of blood in a human body	

N7a Units
Length, Mass and Capacity

1) Try to match up A to F with U to Z

A	Mass of the Earth	U	1460 000 000 000 000 000 000 litres
B	Capacity of all water on Earth	V	2 400 km
C	Length of airways in the lungs laid end-to-end	W	3 041 409 000 000 000 kg
D	Average capacity of air breathed in a day	X	100 000 km
E	Mass of Mount Everest	Y	5 980 000 000 000 000 000 000 000 kg
F	Blood vessels in a human body laid end-to-end	Z	11 000 litres



2) The ship is in a harbour.

There are ten rungs visible on the ship's ladder and they are 30 cm apart.

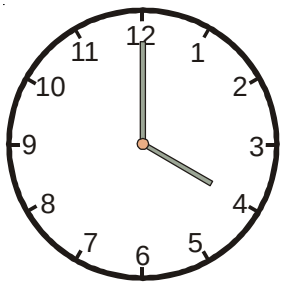
The tide is coming in and the water is rising at the rate of 20 cm per minute.

How many rungs will be visible after 9 minutes?

N7b Units - Time

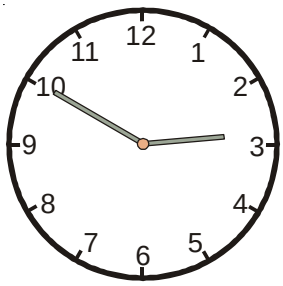
1) Write these times as 24 hour clock times

a)



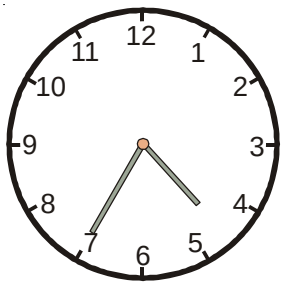
a.m.

b)



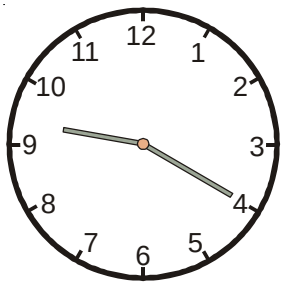
p.m.

c)



p.m.

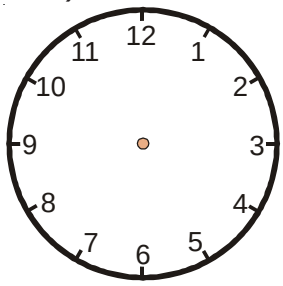
d)



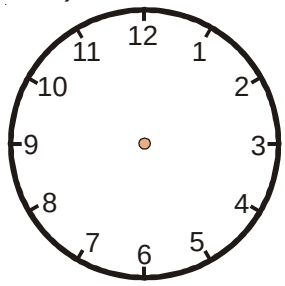
p.m.

2) Draw these times on the clock faces.
Underneath the clocks write whether the time is a.m. or p.m.

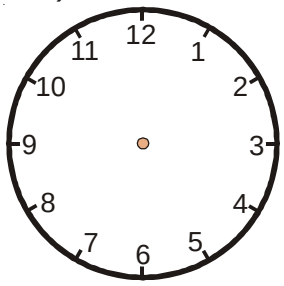
a) 09:40



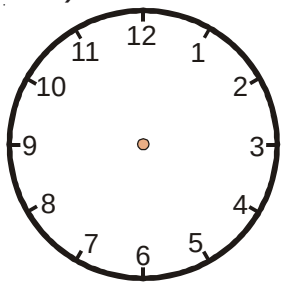
b) 18:10



c) 13:35



d) 23:55



3) Peter wants to watch a programme which begins at 8.00 p.m.
It is now 4.30 p.m.
How much time will Peter have to wait?

4) Susie is going to watch a programme which begins at 20:30 and lasts for one hour and forty five minutes.
What time will it finish?

N7b Units - Time

1) Here is a train timetable for trains going from London Euston to Crewe.

London Euston	09:38	12:49	15:46	16:49	17:17	17:48
Northampton	10:25	--------	--------	--------	--------	--------
Rugby	10:47	13:47	--------	--------	--------	--------
Nuneaton	11:00	14:01	--------	--------	--------	--------
Atherstone	--------	14:07	--------	--------	--------	--------
Polesworth	--------	14:12	--------	--------	--------	--------
Tamworth	11:15	14:17	15:53	--------	18:24	--------
Lichfield	11:22	14:23	--------	18:03	--------	19:00
Rugeley	--------	14:33	--------	--------	--------	--------
Stafford	--------	14:44	--------	--------	--------	--------
Crewe	12:00	15:09	17:31	18:41	19:07	19:34

a) How many trains stop at Tamworth?

b) If Tom gets to London Euston at 15:30 how long will he have to wait for a train to take him to Crewe?

c) How many minutes does the 09:38 London Euston train take to get to Northampton?

d) How many minutes does the 14:23 Lichfield train take to get to Crewe?

e) How long does the 17:48 London Euston train take to get to Crewe in hours and minutes?

2) You have two egg-timers.

One takes 11 minutes for the sand to run through and the other takes 7 minutes.

You want to boil an ostrich egg for 15 minutes.

How can you measure exactly 15 minutes with your two egg-timers?

11 minute timer

7 minute timer

N7c Units - Money

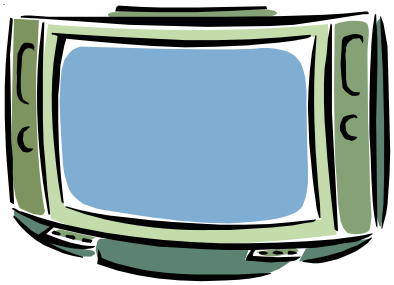
1) Write the following amounts of money using a £ sign and numbers.
   a) Three pounds and thirty seven pence.
   b) Twenty four pounds and fifty pence.
   c) Two hundred and five pounds.
   d) Nine pounds and sixty pence.
   e) Nine pounds and six pence.
   f) Forty eight pence.

2) Write the following amounts of money in words.
   a) £2.78
   b) £6.07
   c) £5.40
   d) £0.24

3) Work out the following on a calculator and write the answers correctly:
   a) £115.23 ÷ 23
   b) £100.80 ÷ 14
   c) 71p × 10
   d) £6.40 – £3.83 + £2.10
   e) £14.83 + £6.17

N7c Units - Money

Three men went into a second-hand shop to buy a television.



It was priced in the window at £30.

Each of them handed over £10 to the shop assistant.

As the assistant opened the till, the manager had a quiet word with him, “that TV is in the sale and is only £25 now, you will have to give them £5 back.”

The assistant was very lazy and couldn’t be bothered to count out the right change for each man.

Instead, he took 5 £1 coins out of the till.

He put two of them in his own pocket and gave each man £1 back.

Here’s the problem:

The men have now paid £9 each for the TV.

The assistant has kept £2 for himself.

3 × £9 = £27.

£27 + £2 = £29.

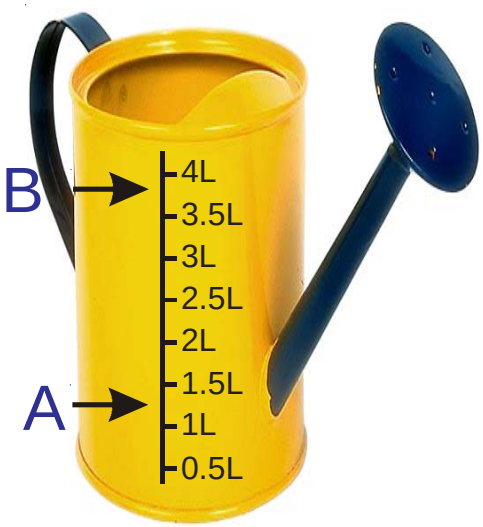
But £30 was handed over in the first place.

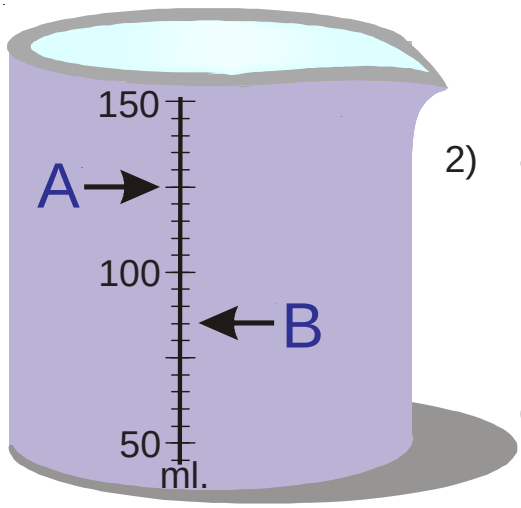
WHERE IS THE MISSING £1?

N8 Reading Scales

1) a) If water comes up to arrow A, how much will there be in the container?

b) About how much water will there be if it comes up to arrow B?

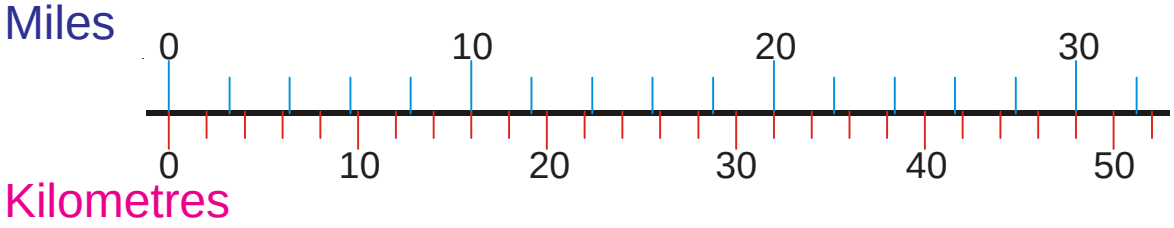




2) a) If milk comes up to arrow A, how much milk will there be in the container?

b) How much milk will there be if it comes up to arrow B?

c) Draw arrow C to show 140ml of liquid.



3) Use the scale to convert

a) 10 miles to km.

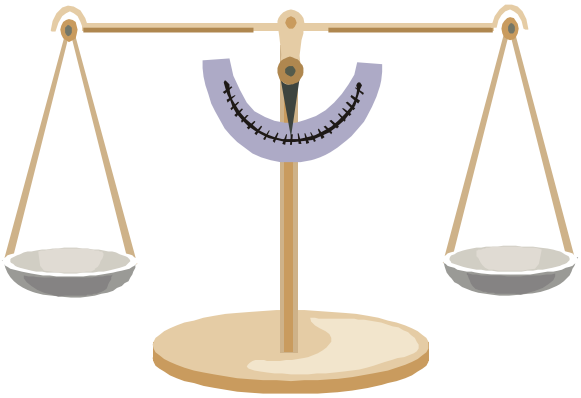
b) 40 km to miles.

c) 16 miles to km.

d) 8 km to miles.

N8 Reading Scales

1) You have eight genuine gold coins and one fake gold coin.
Each genuine coin weighs one ounce.
The fake coin weighs slightly less but not enough to detect by hand.
You are allowed to use the balance pans just twice to detect the false coin.
How do you find the fake?



2) You have a 3 pint jug and a 5 pint jug and as much water from a tap as you like.
How can you use the two jugs to measure out **exactly** 4 pints of water?

5 Pints

3 Pints

N9 Mathematical Symbols

1) State the meaning of each of the following symbols

a) =

b) ≠

c) <

d) >

e) ≤

f) ≥

2) Insert the correct symbol to make these sentences true

a) 4 + 5 6 + 2

b) 10 – 3 9 + 1

c) 6 + 2 2 × 4

3) State whether each statement is TRUE or FALSE

a) 7 < 4

b) 68p = £0.68

c) 11 > 3

4) You need to be 1.4 m or taller to ride on a rollercoaster. Write a mathematical statement about the heights of people (*h* metres) allowed on the rollercoaster.

N10 Factors

1) Write down all the factors of:

a) 6

b) 8

c) 10

d) 12

e) 20

f) 21

2) 100 has nine factors.

What are they?

3) The numbers 2, 3, 5 and 7 all have exactly two factors.

Find the next four numbers with only two factors.

---

4) The numbers 1, 4, 9 and 16 all have an odd number of factors.

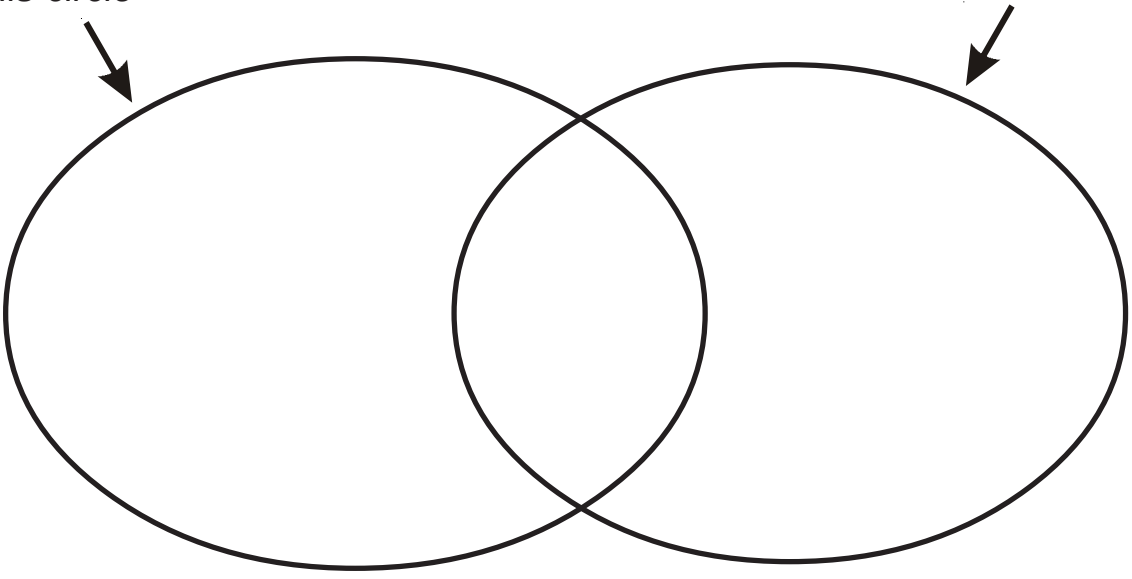
Find the next three numbers which have an odd number of factors.

---

5) Put the correct numbers in the circles.
Be careful of the overlaps.

Factors of 24 in this circle

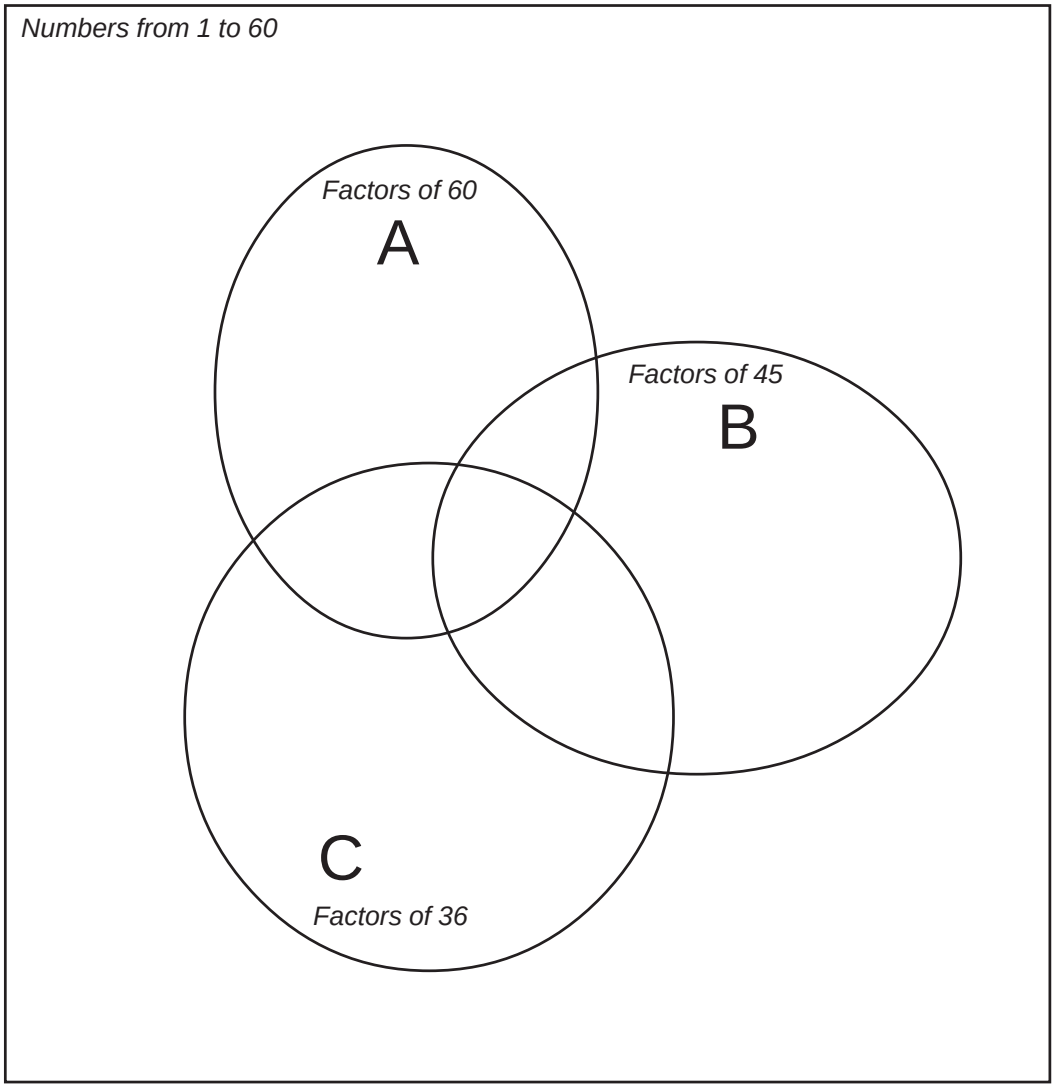
Factors of 40 in this circle



N10 Factors

Place all the whole numbers from 1 to 60 in the diagram below.
However, you must stick to these four rules:

1) In the rectangle you must have every whole number from 1 to 60
2) In circle A you must have all the factors of 60
3) In circle B you must have all the factors of 45
4) In circle C you must have all the factors of 36



N11 Multiples

1) a) Write down the first five multiples of 3.

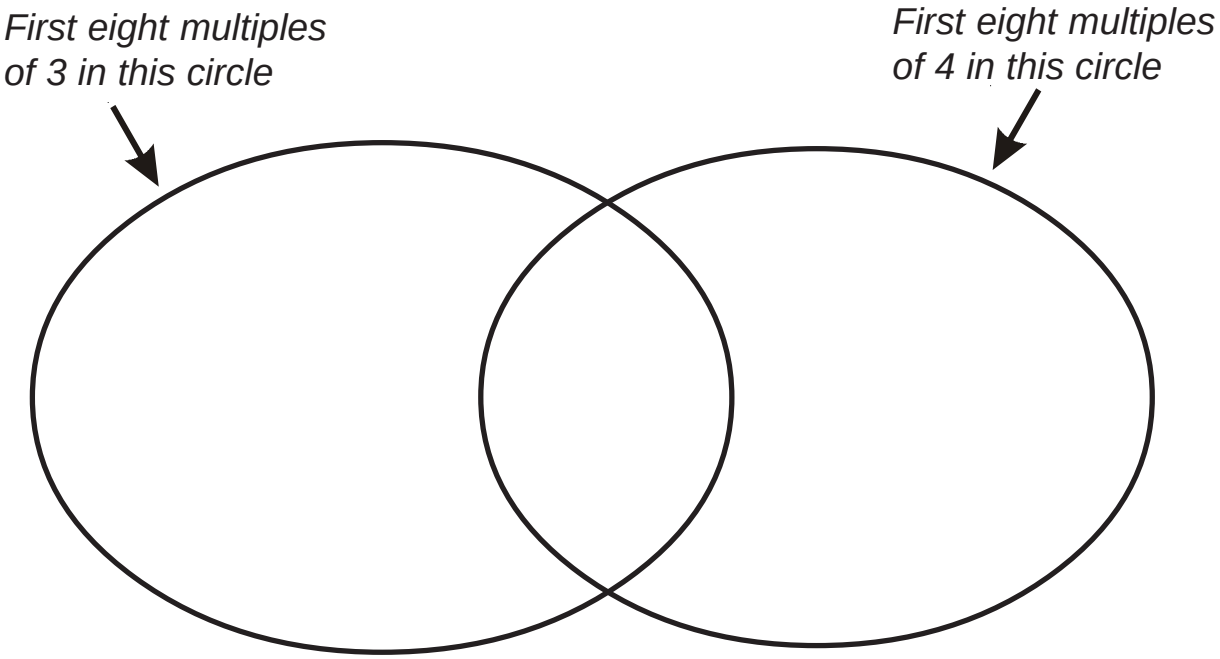
b) Write down the first five multiples of 7.

c) Write down the first five multiples of 4.

2) 6, 12, 18, 24, 30 are the first five multiples of which number?

3) What are the eighth, ninth and tenth multiples of 11?

4) Put the correct numbers in these circles.
Be careful of the overlaps.



N11 Multiples

The sieve of Eratosthenes

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	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Just follow these steps:

a) Cross out 1.

b) Shade in the square with 2 in it.
Now cross out all other multiples of 2.

c) Shade in the 3 square.
Cross out all other multiples of 3
(some will already be crossed out).

d) Shade in the 5 square.
Cross out all other multiples of 5.

e) Shade in the 7 square.
There should be just three
other multiples of 7 which
haven't already been crossed out.
Cross them out.

f) Shade in every square that hasn't
been crossed out.

g) Write out the numbers in every
shaded square.

h) The numbers you have written down
have a special name. **What is it**?

N12 Number Patterns

Example

3, 5, 7, 9, 11, 13, ?, ?, ?

a) Describe the number pattern. *It goes up in 2s*

b) What are the next three terms? *15, 17, 19*

1) For each number pattern:

   a) Describe the pattern

   b) Work out what the next three terms are

      (i) 2, 4, 6, 8, 10, 12, ?, ?, ?

      (ii) 1, 4, 7, 10, 13, 16, ?, ?, ?

      (iii) 5, 12, 19, 26, 33, 40, ?, ?, ?

      (iv) -2, 3, 8, 13, 18, 23, ?, ?, ?

      (v) 36, 33, 30, 27, 24, 21, ?, ?, ?

      (vi) -12, -8, -4, 0, 4, 8, ?, ?, ?

      (vii) 100, 91, 82, 73, 64, 55, ?, ?, ?

      (viii) 7, 8.5, 10, 11.5, 13, 14.5, ?, ?, ?

2) For both of the following number patterns:

   a) Describe the pattern

   b) Work out what the next three terms are

      (i) 1, 4, 9, 16, 25, 36, ?, ?, ?

      (ii) 1, 3, 6, 10, 15, 21, ?, ?, ?

N12 Number Patterns

1) Work out the next two terms for each of the following number patterns:

a) 3, 8, 15, 24, 35, ?, ?

b) 4, 14, 36, 76, 140, ?, ?

2) Work out the next two terms for each of the following number patterns:

a) 1, 2, 4, 8, 16, 32, ?, ?

b) 2, 7, 22, 67, 202, ?, ?

3) Work out the next two terms for each of the following number patterns:

a) 1, 1, 2, 3, 5, 8, 13, 21, ?, ?

b) 1, 2, 3, 6, 11, 20, 37, 68, ?, ?

4) Work out the next two terms for each of the following :

a) O, T, T, F, F, S, S, ?, ?

b) J, F, M, A, M, J, J, ?, ?

5) Choose any number between 1 and 20.
If your number is even, halve it and write down the answer.
If your number is odd, multiply it by three and add one. Write down the answer.
Look at your answer and follow the same rules:
If it is even you halve it and write down the answer.
If it is odd you multiply by three and add one and write down the answer.
Only stop when you get to one.

Try more starting numbers (of any size).
Do they all go to one?

What about if you use 27 as the number to start with?

6) This number pattern begins with a 1.
After that, every row can be worked out from the row above it.
Can you work out the rule and find out what the question marks should be in the last row?

This is a very difficult question and not many succeed.

1
1 1
2 1
1 2 1 1
1 1 1 2 2 1
3 1 2 2 1 1
1 3 1 1 2 2 2 1
1 1 1 3 2 1 3 2 1 1
3 1 1 3 1 2 1 1 1 3 1 2 2 1
? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ?

N13a Addition - Integers

1) 1524 + 4273 = _____

2) 7452 + 216 = _____

3) 24578 + 1215 = _____

4) 591 + 372 + 85 = _____

5) 9876 + 55 + 1039 = _____

N13a Addition - Integers

In the sum on the right

a) replace three of the digits with zeros so that the answer is 1411

b) replace three of the digits with zeros so that the answer is 1513

c) replace three of the digits with zeros so that the answer is 1626

d) replace three of the digits with zeros so that the answer is 1583

1	1	1	
2	2	2	
3	3	3	
4	4	4	
5	5	5	+

N13b Addition - Decimals

1) 59.1 + 37.2 = ____

2) 24.75 + 9.98 = _____

3) 94.78 + 104.9 = _____

4) 309 + 12.5 + 631.4 = _____

5) 105 + 7.32 + 51.8 + 2804 = _____

N13b Addition - Decimals

Choose a number from a box and a number from a loop to make the totals in a) and b).

3.61	2.975	2.35	1.3	6.72
3.2	7.65	1.006	3.58	2.25

a) ☐ + ◯ = 4.6

b) ☐ + ◯ = 11.26

N14a Subtraction - Integers

1) 14562 – 1251 = _____

2) 6652 – 716 = _____

3) 42160 – 39215 = _____

4) 2300 – 934 = _____

5) 50000 – 2166 = _____

N14b Subtraction - Decimals

1) 68.1 – 27.3 = _____

2) 24.75 – 0.098 = _____

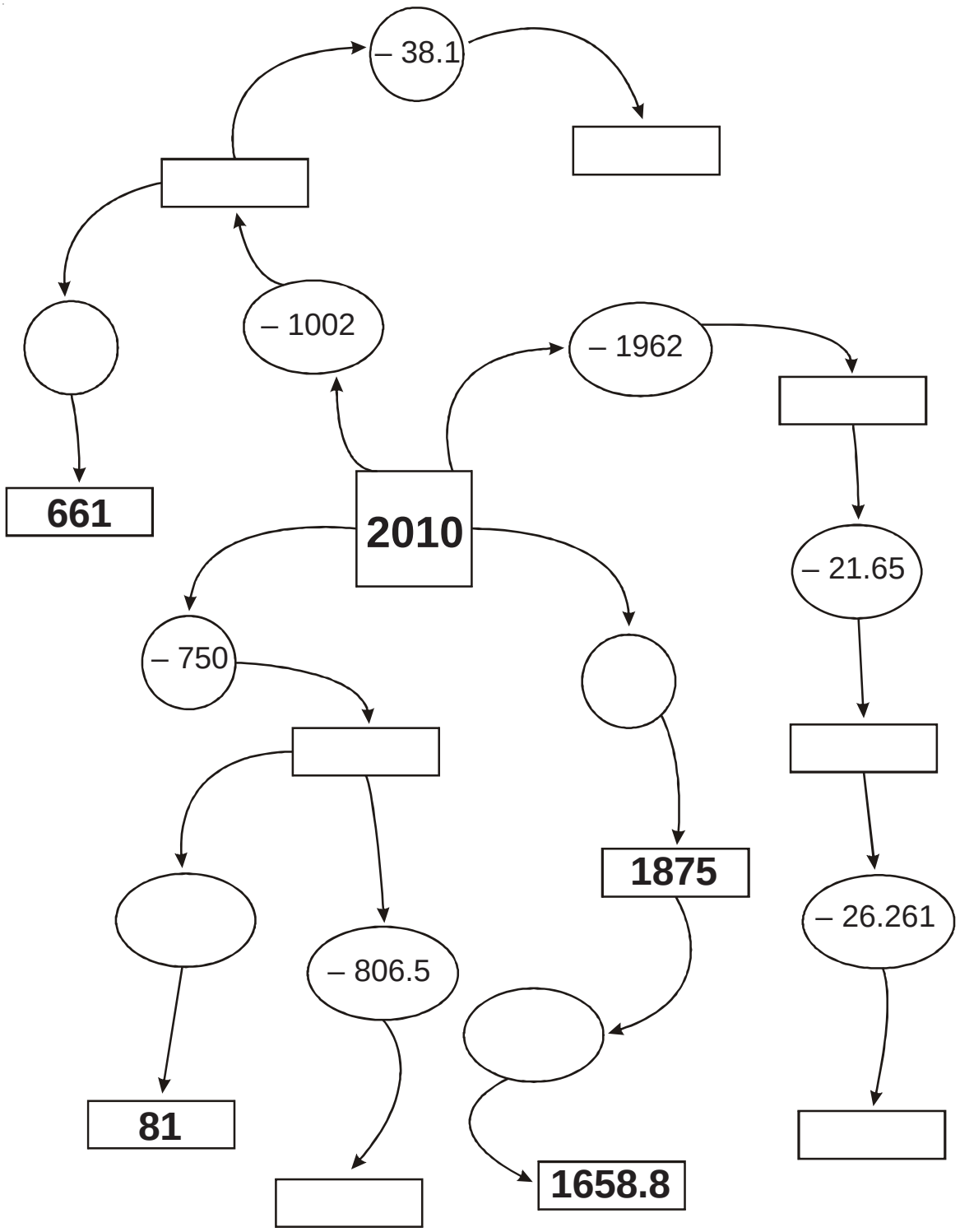
3) 94.78 – 36 = _____

4) 3564 – 1971.6 = _____

5) 800 – 237.62 = _____

N14b Subtraction - Decimals

Complete the boxes and the circles:



N15a Short Multiplication Integers

1) $3 \times 13 =$ _____

2) $55 \times 4 =$ _____

3) $9 \times 64 =$ _____

4) $92 \times 5 =$ _____

5) $7 \times 87 =$ _____

6) $342 \times 8 =$ _____

7) $6 \times 208 =$ _____

8) $745 \times 4 =$ _____

9) $289 \times 7 =$ _____

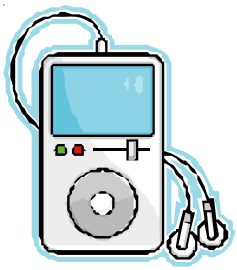
10) $113 \times 9 =$ _____

N15a Short Multiplication Integers

Here are some items available from a local shop:

Jacket: £17

Trainers: £56



MP3 player: £32

Television: £499

Work out the cost of:

a) 5 jackets _____

b) 6 MP3 players _____

c) 4 pairs of trainers _____

d) 7 televisons _____

N15b Short Multiplication Decimals

1) $4 \times 1.2 =$ _____

2) $6.5 \times 3 =$ _____

3) $9 \times 18.7 =$ _____

4) $3.6 \times 5 =$ _____

5) $7 \times 8.2 =$ _____

6) $6 \times 1.39 =$ _____

7) $9.2 \times 8 =$ _____

8) $8.35 \times 4 =$ _____

9) $3.62 \times 7 =$ _____

10) $25.3 \times 9 =$ _____

N15b Short Multiplication Decimals

1) Here are some items available from a local shop:

Milk: £1.20

Bread: £0.65

Lollies: £0.30

Chocolates: £3.99

Work out the cost of:

a) 7 lollies, _____

b) 3 bottles of milk, _____

c) 2 loaves of bread, _____

d) 5 boxes of chocolates. _____

2) Rulers cost £0.25 each.
Pens cost £0.45 each.
Kelly buys 3 rulers and 5 pens.

Work out how much she pays.

_____

N16 Short Division of Integers

1) 786 ÷ 2 = _____

2) 465 ÷ 5 = _____

3) 448 ÷ 8 = _____

4) 552 ÷ 6 = _____

5) 801 ÷ 9 = _____

6) 5976 ÷ 8 = _____

7) 9080 ÷ 5 = _____

8) 17801 ÷ 7 = _____

9) 18054 ÷ 6 = _____

10) 374877 ÷ 9 = _____

N16 Short Division of Integers

1) Here are some items available from a local shop:




Watch: £ ____ Camera: £ ____ Camcorder: £ ____ Laptop: £ _____

Work out the unit price of each item knowing that:

7 watches cost £336,

5 cameras cost £380,

4 camcorders cost £1260,

6 laptops cost £7794.

2) a) If 3 chairs cost £17.40,
how much would one of them cost?

£_____

b) If 7 shirts cost £34.93,
how much would one of them cost?

£_____

N17a Multiplying and Dividing by powers of 10 - Integers

1) $75 \times 100 =$ _____

2) $102 \times 10 =$ _____

3) $9 \times 1000 =$ _____

4) $450 \div 10 =$ _____

5) $3800 \div 10 =$ _____

6) $9700 \div 100 =$ _____

7) $60 \times 1000 =$ _____

8) $7000 \div 100 =$ _____

9) $210 \times 1000 =$ _____

10) $1050000 \div 1000 =$ _____

N17a Multiplying and Dividing by powers of 10 - Integers

The table shows the approximate populations of five different places.

Place	Approximate population
London	7 000 000
Glasgow	700 000
Barnsley	70 000
Penkbridge	7 000
High Bickington	700

Complete these sentences:

The population of **Barnsley** is about **10 times** bigger than the population of .....

The population of ..... is about **100 times** bigger than the population of **Barnsley**.

The population of Glasgow is about ..... **times** bigger than the population of **Penkbridge**.

The population of **Barnsley** is about **10 times** smaller than the population of .....

The population of ..... is about **100 times** smaller than the population of **Barnsley**.

The population of High Bickington is about ..... **times** smaller than the population of **Penkbridge**.

N17b Multiplying and Dividing by powers of 10 - Decimals

1) $3.6 \times 10 =$ _____

2) $82.9 \times 100 =$ _____

3) $0.5 \times 1000 =$ _____

4) $47 \div 10 =$ _____

5) $106.4 \div 10 =$ _____

6) $9.9 \div 100 =$ _____

7) $6.2 \times 1000 =$ _____

8) $70 \div 1000 =$ _____

9) $0.035 \times 10000 =$ _____

10) $0.01 \div 100 =$ _____

N17b Multiplying and Dividing by powers of 10 - Decimals

1) Fill in the missing box in each case.

a) 12 → ×100 → ☐

b) 7.5 → ÷10 → ☐

c) 83.1 → ☐ → 8310

d) 0.9 → ☐ → 900

e) 662 → ☐ → 66.2

f) 540 → ☐ → 5.4

g) 0.6 → ☐ → 0.006

h) ☐ → ÷100 → 73.7

i) ☐ → ×10 → 0.18

j) ☐ → ×1000 → 104

2) Using the fact below:

$$365 \times 17 = 6205$$

Work out the following

a) $36.5 \times 17 =$ ____

b) $36.5 \times 1.7 =$ ____

c) $365 \times 170 =$ ____

d) $3650 \times 1.7 =$ ____

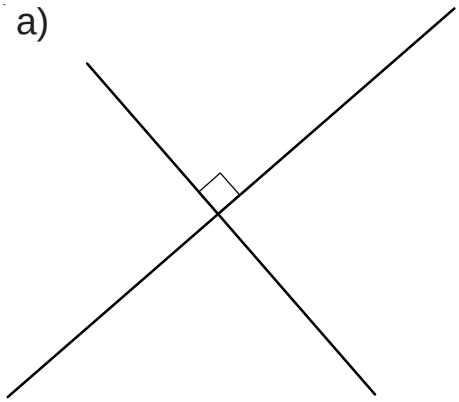
e) $62.05 \div 17 =$ ____

f) $6.205 \div 36.5 =$ ____

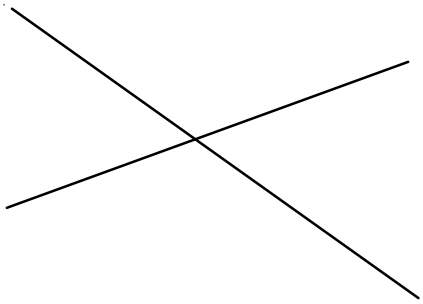
G1 Basic Geometric Definitions

1) Which of these diagrams show perpendicular lines?

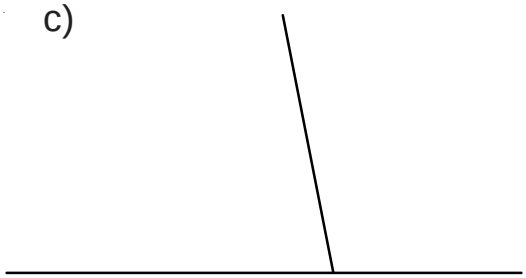
a)



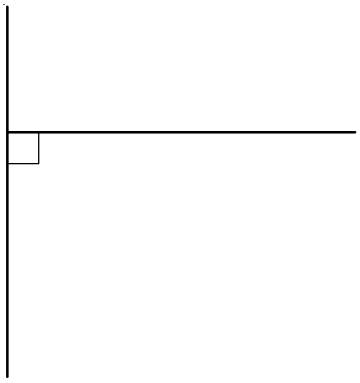
b)



c)



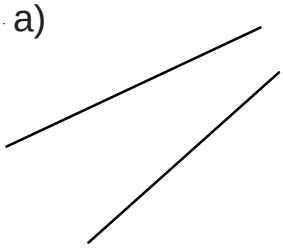
d)



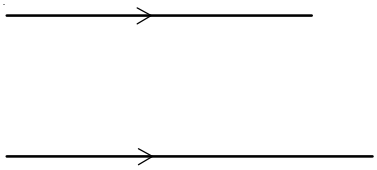
2) Perpendicular lines meet at what angle?

3) Which of these diagrams show parallel lines?

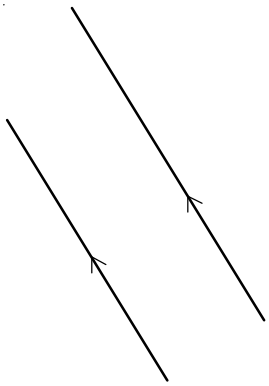
a)



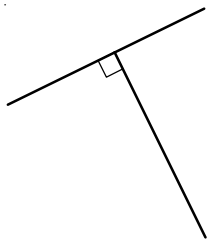
b)



c)



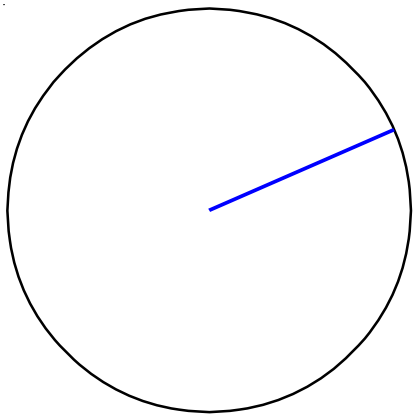
d)



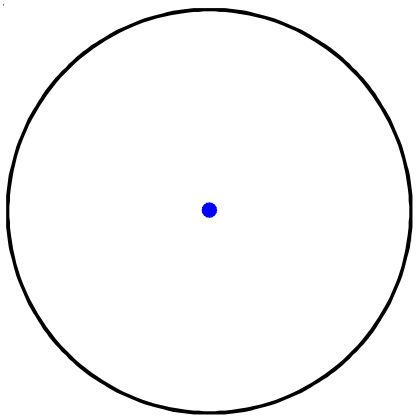
G2 Properties of Circles

1) Name the part of the circle shown on each diagram.

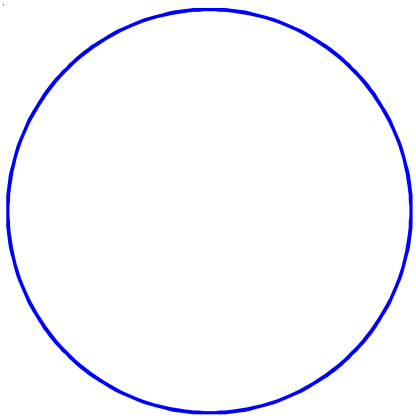
a)



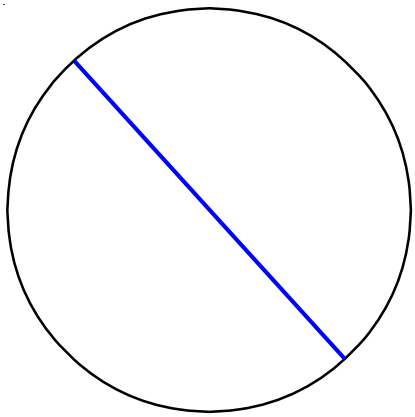
b)



c)

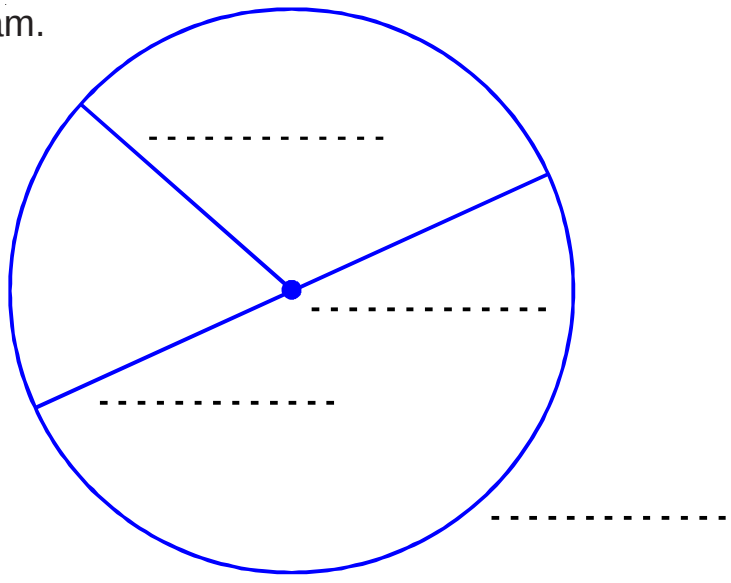


d)



2) What is the relationship between the radius and the diameter of a circle?

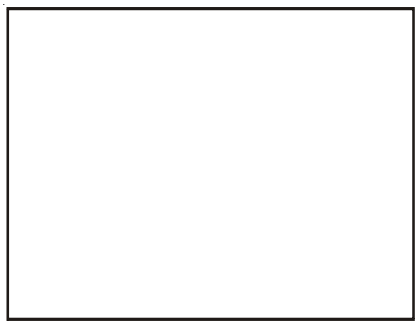
3) Label this diagram.



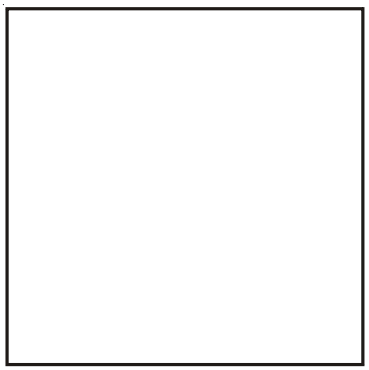
G3 Line Symmetry

Look at each shape, read the description and then draw in all the lines of symmetry.

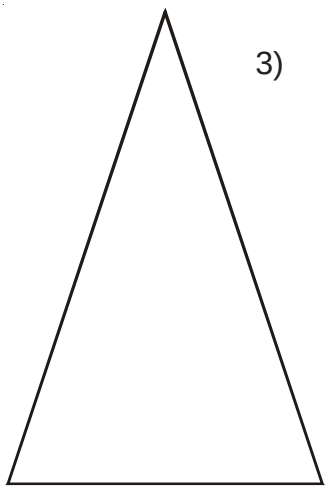
1) **Rectangle**
Two lines of symmetry



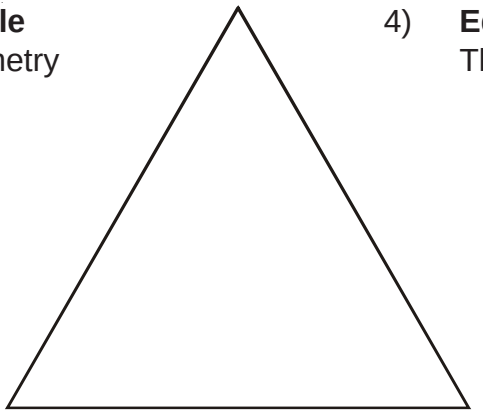
2) **Square**
Four lines of symmetry



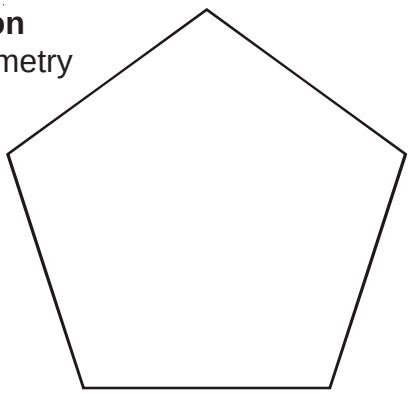
3) **Isosceles triangle**
One line of symmetry



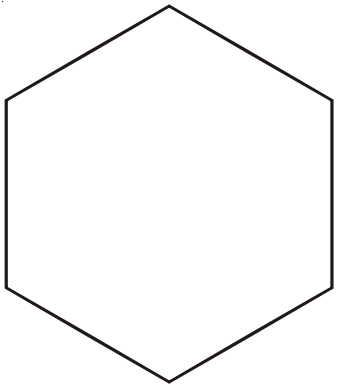
4) **Equilateral triangle**
Three lines of symmetry



5) **Regular pentagon**
Five lines of symmetry

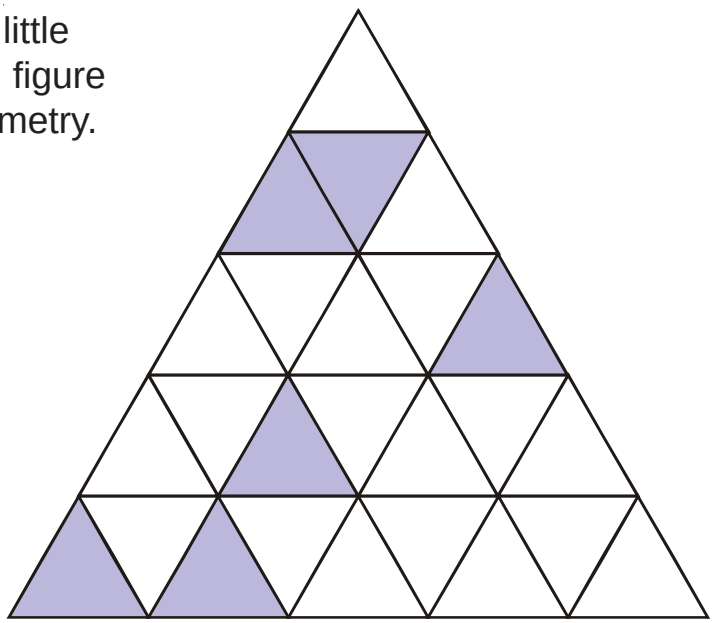


6) **Regular hexagon**
Six lines of symmetry

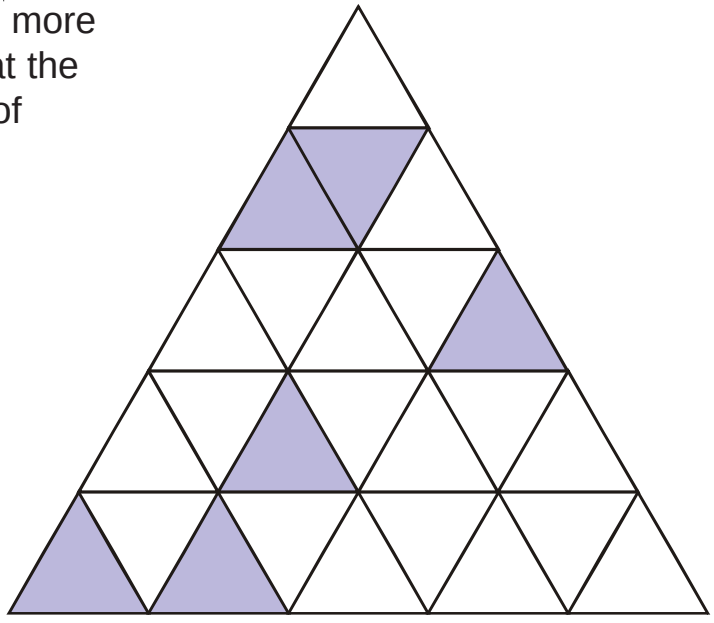


G3 Line Symmetry

1) Shade in **five** more little triangles so that the figure has one line of symmetry.



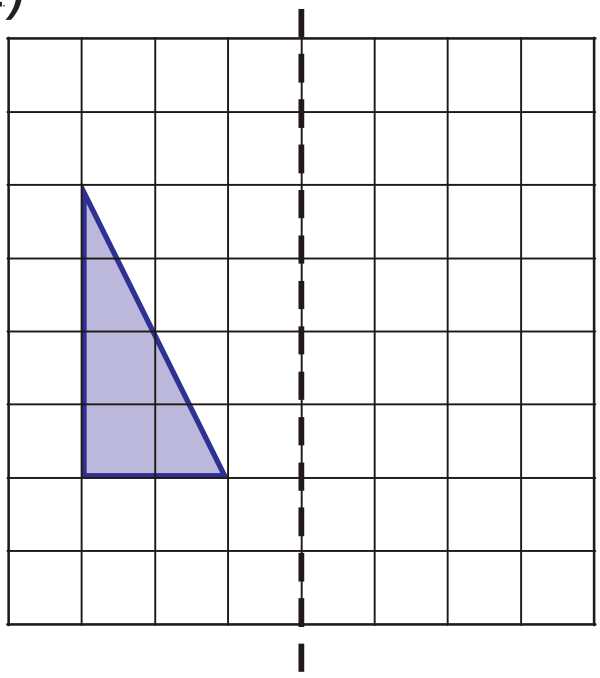
2) Shade in **just three** more little triangles so that the figure has one line of symmetry.



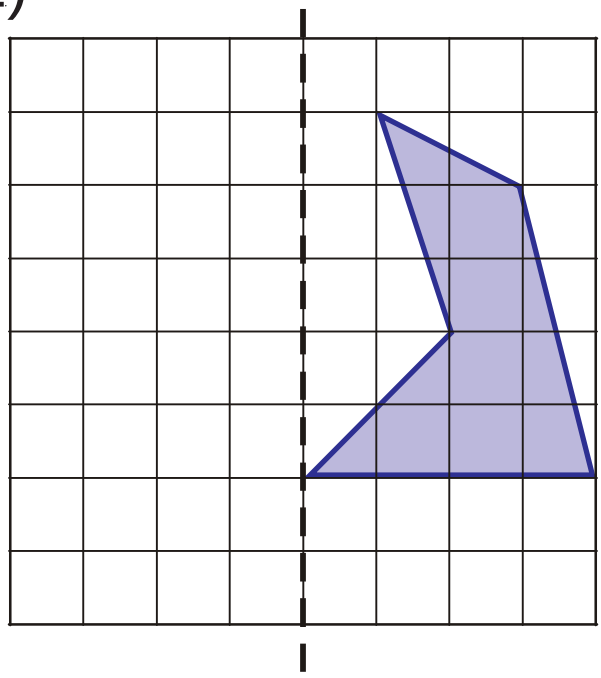
G4a Reflection
Horizontal and Vertical Mirror Lines

In all four questions, reflect the shaded shape in the dotted mirror line.

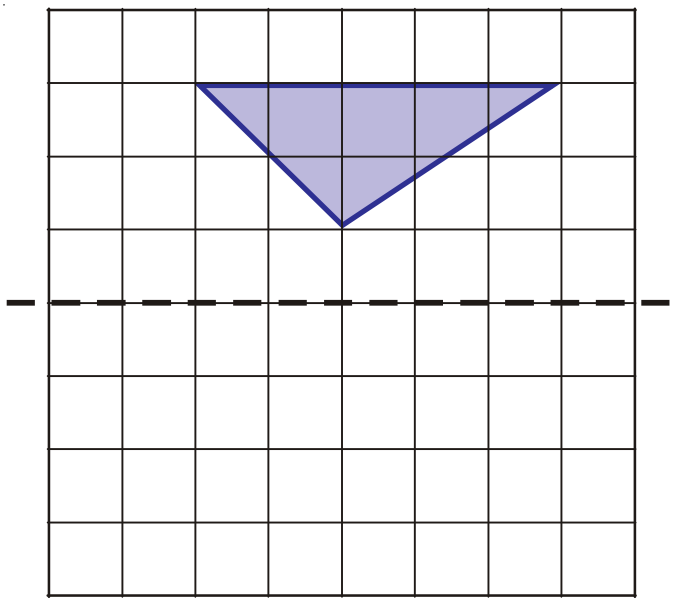
1)



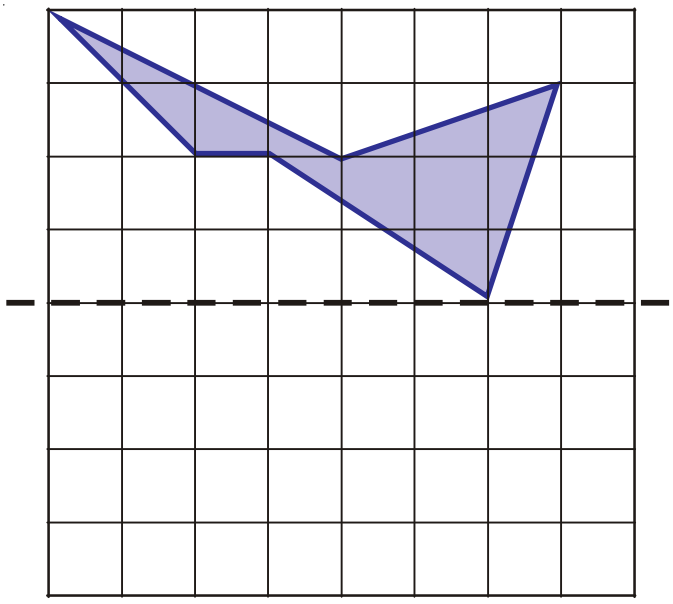
2)



3)

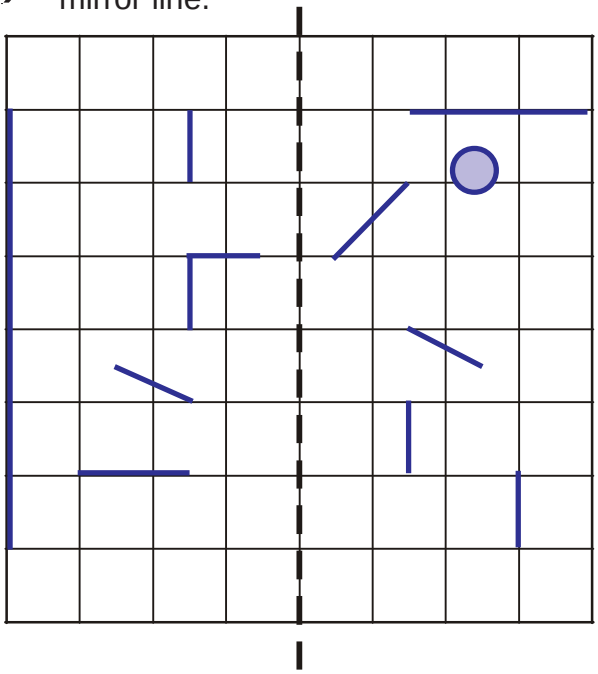


4)

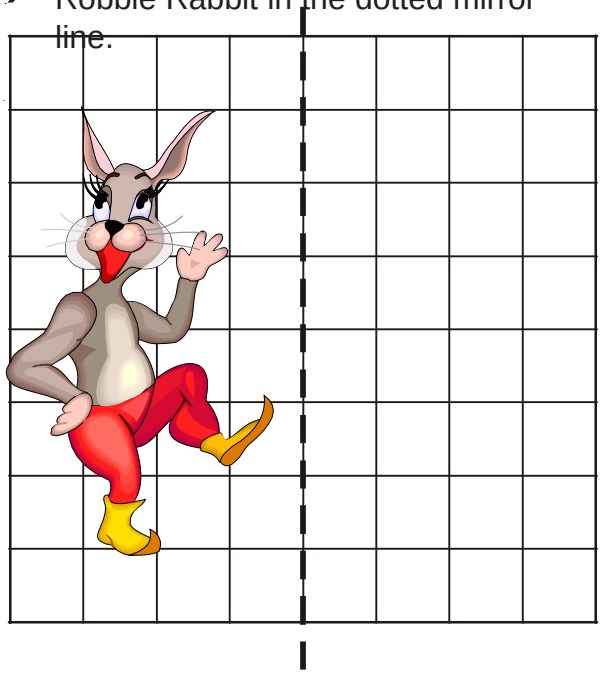


G4a Reflection
Horizontal and Vertical Mirror Lines

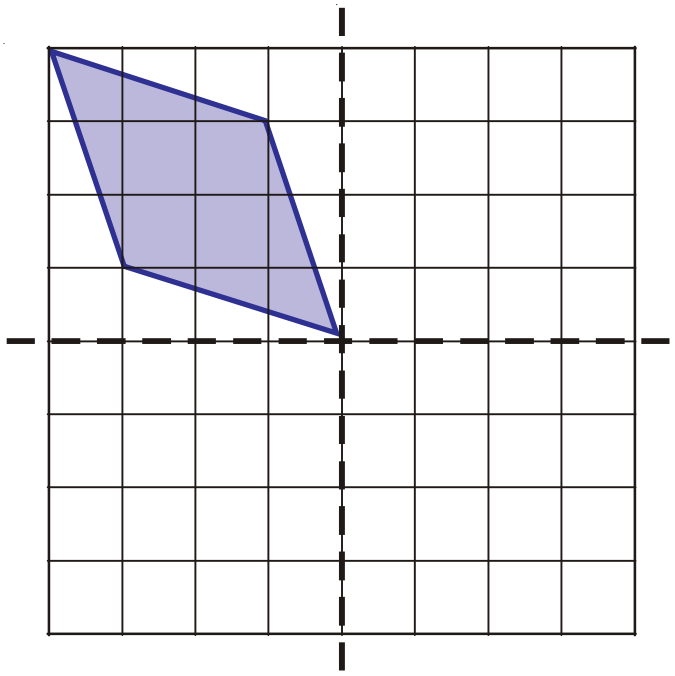
1) Reflect every line in the dotted mirror line.



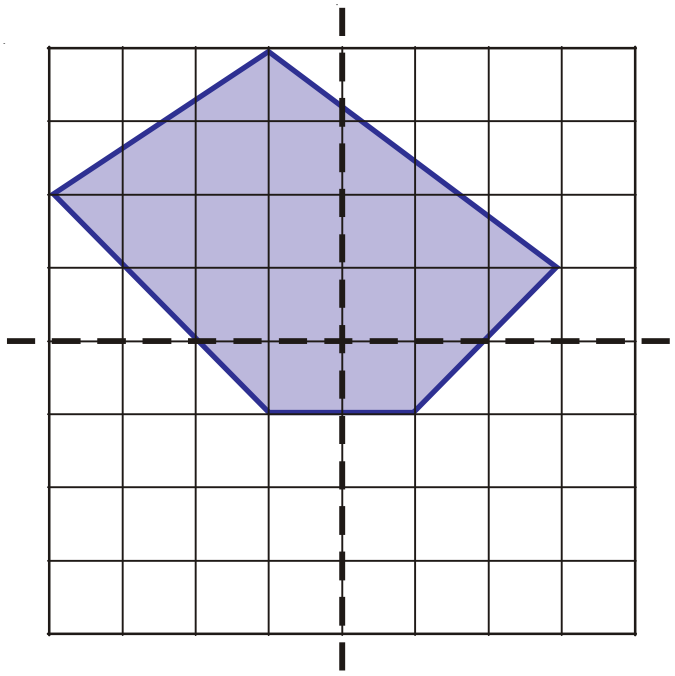
2) Use the grid to help you reflect Robbie Rabbit in the dotted mirror line.



3) Reflect the shape in the vertical mirror line.
Then, reflect both shapes in the horizontal mirror line.



4) Reflect the shape in the vertical mirror line.
Then, reflect both shapes in the horizontal mirror line.

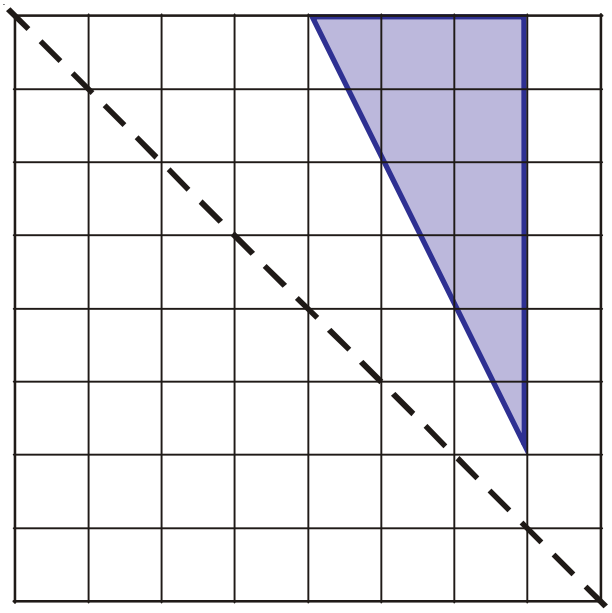


G4b

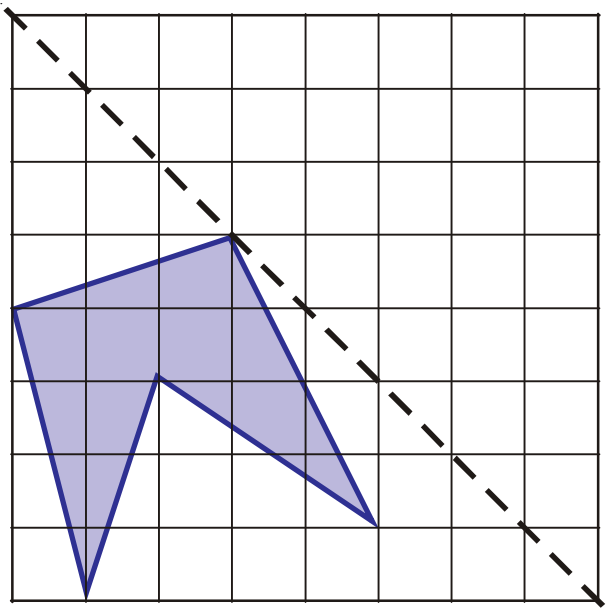
Reflection
Diagonal Mirror Lines

In all four questions, reflect the shaded shape in the dotted mirror line.

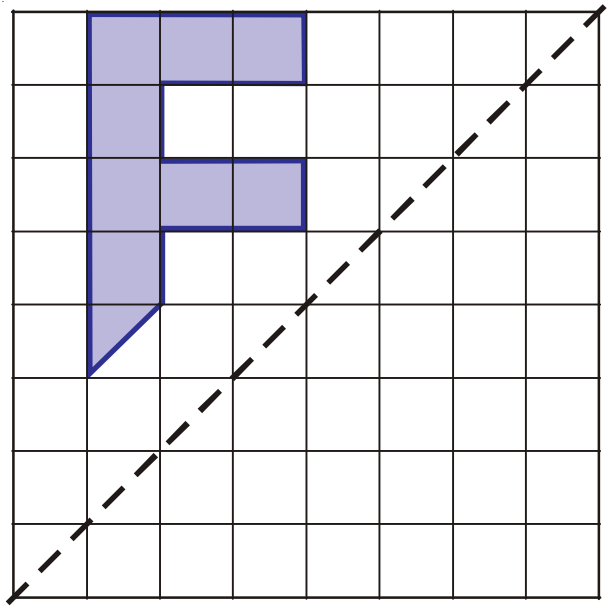
1)



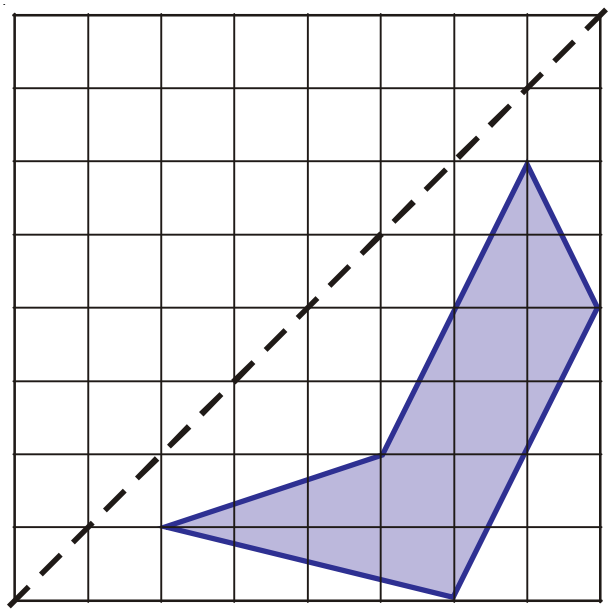
2)



3)



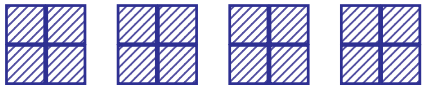
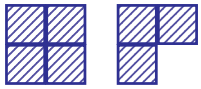
4)



S1a Pictograms - Interpreting

An art gallery uses a pictogram to show the number of paintings sold over a 5 week period.

Key:  = 4 paintings

Week 1	
Week 2	
Week 3	
Week 4	
Week 5	

a) How many paintings were sold in week 1?

b) In which week was the least number of paintings sold?

c) How many paintings were sold in week 3?

d) How many paintings were sold in week 4?

e) How many more paintings were sold in week 2 compared with week 5?

f) How many paintings were sold altogether in the five weeks?

S1b Pictograms - Drawing

All year 6 pupils in a school were each given a new pencil case as a leaving present.

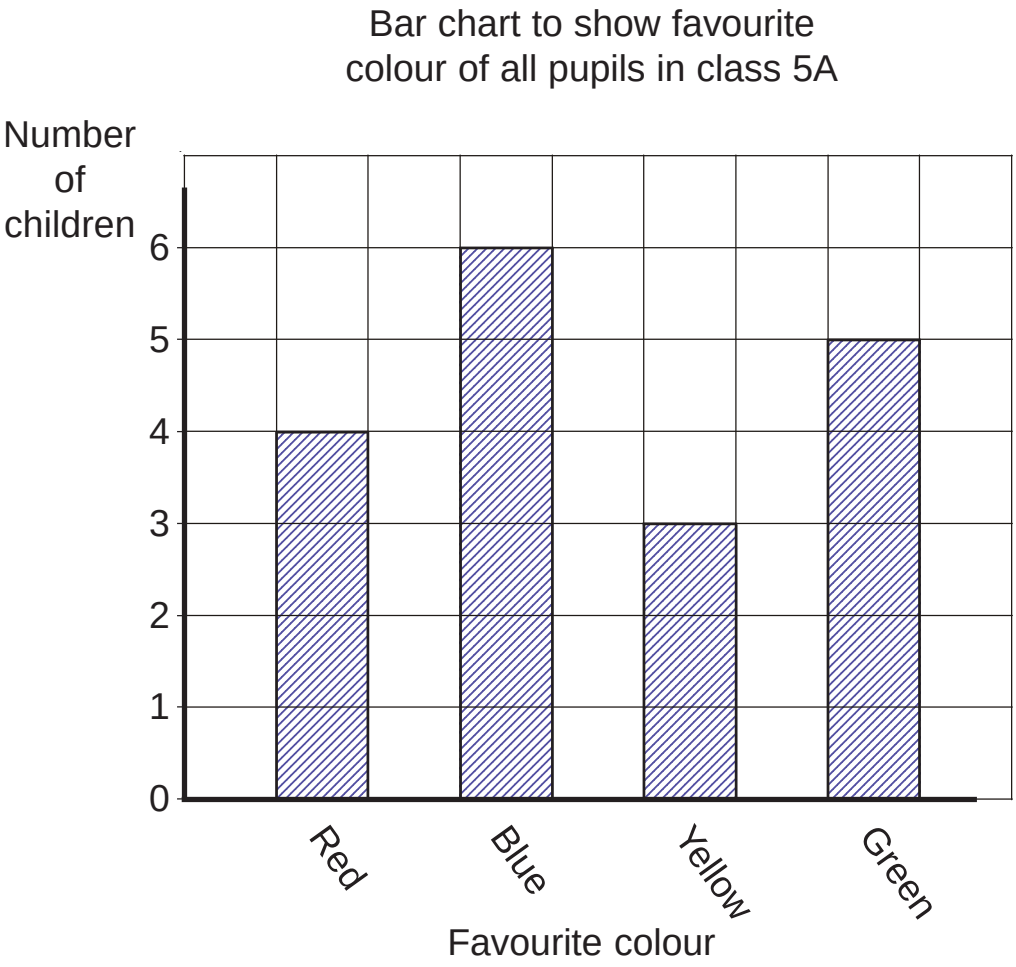
The pupils chose which colour they would like and this is shown in the table below.

Colour of pencil case	Frequency
Red	17
Green	4
Black	10
Yellow	15
Blue	8

Draw a pictogram to show this information.

Let  represent 4 pencil cases.

S2a Bar Charts - Interpreting



a) How many children chose green as their favourite colour?

b) Which was the least favourite colour in the class?

c) How many more children chose blue than red?

d) How many children are in class 5A?

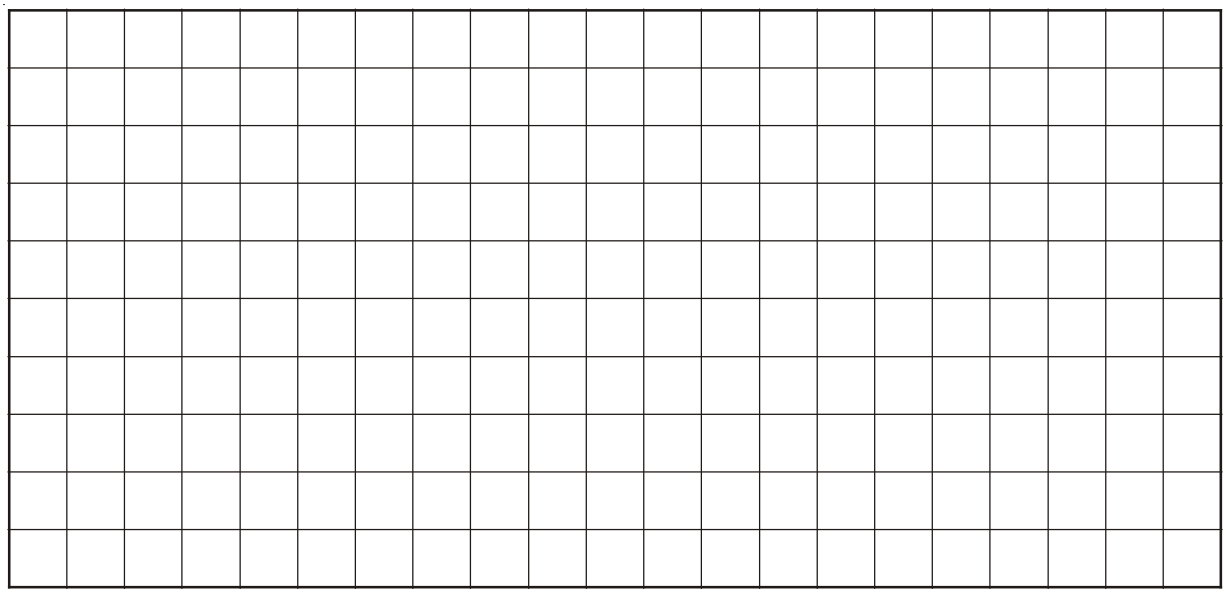
S2b Bar Charts - Drawing

The beginners class in a Judo club has 24 members and each of them has either a white, yellow, orange, green or blue belt.

The table below shows how many of each belt there are.

Colour of belt	Frequency
White	3
Yellow	5
Orange	7
Green	3
Blue	6

On the squared paper, draw a bar chart to show this information.



N18 Negatives in Real-Life

1) Work out the value of each card and then place the cards in order from lowest to highest.

A

The temperature is -2 °C and then rises by 6.5 °C.

B

1 °C colder than freezing point.

C

The temperature is -6 °C then rises by 8 °C before falling by 5 °C.

D

102 °C cooler than boiling point.

2) Work out the value of each card and then place the cards in order from lowest to highest.

E

You have £5 in the bank but write a cheque for £9.

F

Tim owes you £5.
Sam owes you £3.
You owe Ben £12.
Tom owes you £2.

G

You have £10 in the bank but then write cheques for £6, £2.50, £5 and £1.

H

You owe three people £0.50 each.

I

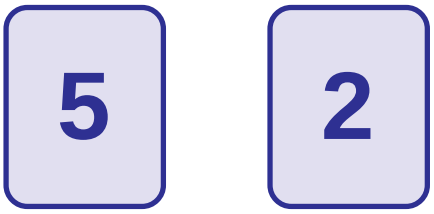
You owe five people £1.25 each but someone owes you £3.50

J

You owe seven people £2 each but six people each owe you £1.50

N18 Negatives in Real-Life

1)



These two cards each have a number on the back as well as on the front.

Eric shuffles the cards quite a few times and lays them on the table.

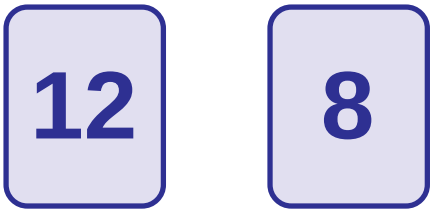
He then adds the numbers he can see.

He discovers there are four different totals.

They are: 3, 5, 7 and 9.

Can you work out what numbers are on the back of each card?

2)

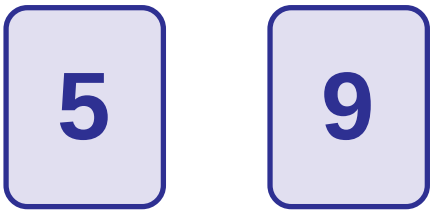


The totals with these cards are:

11, 13, 20 and 22.

Can you work out what numbers are on the back of each card?

3)

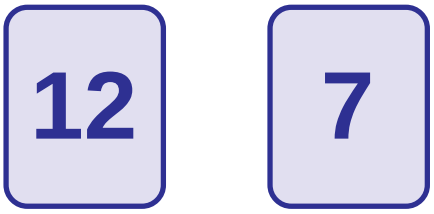


The totals with these cards are:

2, 7, 9 and 14.

Can you work out what numbers are on the back of each card?

4)



The totals with these cards are:

2, 3, 19 and 20.

Can you work out what numbers are on the back of each card?

N19a Directed Numbers Addition and Subtraction

1) The temperature is 3°C at midnight and then falls 8 degrees by 6 a.m.

   What is the temperature at 6 a.m?

2) Tim has only £8 in his bank account but writes a cheque for £15.

   If the cheque is cashed, how much will Tim have in his account?

3) Sue owes £7 to one friend and £6 to another friend.

   She writes this in her diary as (-7) + (-6)

   a) How much does she owe altogether?

   b) What is (-7) + (-6)?

4) Sue still owes £7 to one friend and £6 to another friend but her mother decides to take away the £6 debt by paying it off.

   Sue writes this as (-7) + (-6) – (-6)

   a) How much does Sue owe now?

   b) What is (-7) + (-6) – (-6)?

5) Work out the answers to

   a) 6 – 14

   b) 2 – 12

   c) -1 – 6

   d) -3 – 5

   e) -7 – 15

6) Work out the answers to

   a) 2 – (-3)

   b) 6 – (-5)

   c) -3 – (-6)

   d) -7 – (-2)

   e) -20 – (-18)

7) Work out the answers to

   a) 5 + (-2)

   b) 8 + (-6)

   c) 3 + (-8)

   d) -4 + (-3)

   e) -8 + (-4)

8) Work out the answers to

   a) 4 – (+1)

   b) 7 – (+5)

   c) 1 – (+3)

   d) -6 – (+1)

   e) -1 – (+6)

N19a Directed Numbers Addition and Subtraction

1) Each magic square below has a magic number written above it.

You must fill in the blank squares so that the rows, columns and diagonals add up to the magic number.

a) Magic Number is **12**

	10	
	4	0
	-2	9

b) Magic Number is **15**

2		
15	5	

c) Magic Number is **-27**

		-22
	-9	
		-10

2) Work out which numbers should go in the squares to make the sums correct.

a) $7 + \square = 9$

b) $7 + \square = 5$

c) $2 - \square = -6$

d) $4 - \square = 7$

e) $-5 - \square = 4$

f) $\square + 6 = 4$

g) $\square - 9 = -12$

h) $\square - 14 = -30$

N19b Directed Numbers Multiplication and Division

1) a) $5 \times -7 =$

b) $-3 \times 6 =$

c) $-4 \times -8 =$

d) $2.5 \times -2 =$

e) $-4 \times -1.5 =$

2) a) $3 \times 2 \times -7 =$

b) $-5 \times -4 \times 3 =$

c) $9 \times 2 \times -2 =$

d) $-6 \times -2 \times -3 =$

e) $5 \times -8 \times -1 \times 2 =$

3) a) $8 \div -2 =$

b) $-16 \div 4 =$

c) $-20 \div -5 =$

d) $32 \div -8 =$

e) $-13 \div -2 =$

4) a) $-9 \times 7 \times 2 =$

b) $18 \div -4 =$

c) $-1 \times 2 \times -3 \times 4 \times -5 =$

d) $(24 \div -4) \times -5 =$

e) $(-50 \div 5) \times -2 =$

N20 BODMAS

1) Work out the following:

a) $3 \times 6 - 2$

b) $7 + 2 \times 3$

c) $5 + 3 \times 4 - 1$

d) $(7 + 1) \times 3$

e) $5 - 3 \times 2$

f) $9 - 35 \div 5$

g) $3 \times 2 + 7 + 5 \times 4$

h) $20 - 9 \div 3 + 1$

i) $2 \times (15 - 10) \div 5$

j) $7 + 2 - 3 \times 4$

k) $10 \div (2 + 3)$

l) $10 \div 5 - 8 \div 2$

m) $7 \times (5 - 2) + 10$

n) $48 \div (2 + 3 \times 2)$

o) $4 \times 12 \div 8 - 6$

2) Work out the following:

a) $3^2 - 2^3$

b) $25 - (3 - 1)^2$

c) $8 \times 7 - \sqrt{16}$

d) $36 \div 2^2 - 3 \times 3$

e) $5^3 - (3 \times 15 - 2^5)$

f) $((9 + 1) \times 4) \div 2$

3) Place brackets in the following questions to make the answers correct.

a) $3 \times 5 - 1 = 12$

b) $10 + 2 \times 3 = 36$

c) $7 \times 5 - 2 \times 2 = 42$

d) $24 \div 6 - 2 = 6$

e) $3 + 2 \times 6 \div 10 = 3$

f) $5 \times 5 - 3 \div 4 + 1 = 2$

---

4) If $x = 3$ and $y = 7$, work out the following:

a) $2x - y$

b) $3y + x^2$

c) $y^2 - x^2$

d) $(x + y)^2 - x^3$

e) $5(y - x) + (y + x) \div 2$

f) $10xy - (2y - x)^2$

N20 BODMAS

1) Use the numbers 6, 3, 2 and 1 plus the operations +, –, ×, ÷ to make the numbers 0 to 9.

The numbers must be used in the specified order (6, 3, 2, 1).

They cannot be put together as in 63 for example.

Signs can be used as many times as you like. Brackets can also be used.

0 = **6 3 2 1**	5 = **6 3 2 1**
1 = **6 3 2 1**	6 = **6 3 2 1**
2 = **6 3 2 1**	7 = **6 3 2 1**
3 = **6 3 2 1**	8 = **6 3 2 1**
4 = **6 3 2 1**	9 = **6 3 2 1**

2) Use four 4s plus the operations +, –, ×, ÷ to make the numbers 0 to 9.

All four 4s must be used. 4s cannot be put together as in 44.

Signs can be used as many times as you like. Brackets can be used.

A possible answer for 0 could be ***4 ÷ 4 – 4 ÷ 4***

0 =	5 =
1 =	6 =
2 =	7 =
3 =	8 =
4 =	9 =

N21a Real-Life Tables Distance Tables

1)

London	*All distances are in miles.*		
195	Nottingham		
300	100	Manchester	
330	159	56	Liverpool

a) Write down the distance between London and Nottingham.

b) Write down the names of the two cities which are
(i) The furthest apart.
(ii) The least distance apart.

c) Peter travels from London to Manchester where he collects a parcel.
He then delivers the Parcel in Nottingham before returning to London.
Work out the total distance travelled by Peter.

2)

London	*All distances are in miles.*			
22	Stevenage			
75	48	Peterborough		
195	165	130	Doncaster	
235	210	170	45	York

Emma lives in Doncaster.
She has to drive to Peterborough to pick up her friend, David, and then continue on to London to attend a graduation ceremony which begins at 11 am.
The ceremony will last two hours and she will then return to Doncaster with David.

a) How far does Emma travel in order to get to London with David?

b) If Emma averages 50 mph on the return trip, at what time would she be back in Doncaster?

N21b Real-Life Tables Timetables

1) Here is part of a railway timetable

Stockport	05:26	06:16	06:55	07:15	07:55
Stoke	05:55	06:45	07:24	-	-
Stafford	06:12	-	07:41	-	08:41
Euston	08:09	08:26	-	09:11	10:06

a) Rosie wants to travel from Stockport to Euston. She must arrive in Euston before 09:00.

(i) What is the latest time she could depart from Stockport?

(ii) How long will her journey last?

b) James gets to Stockport station at 07:00.
How long will he have to wait for the next train to Stafford?

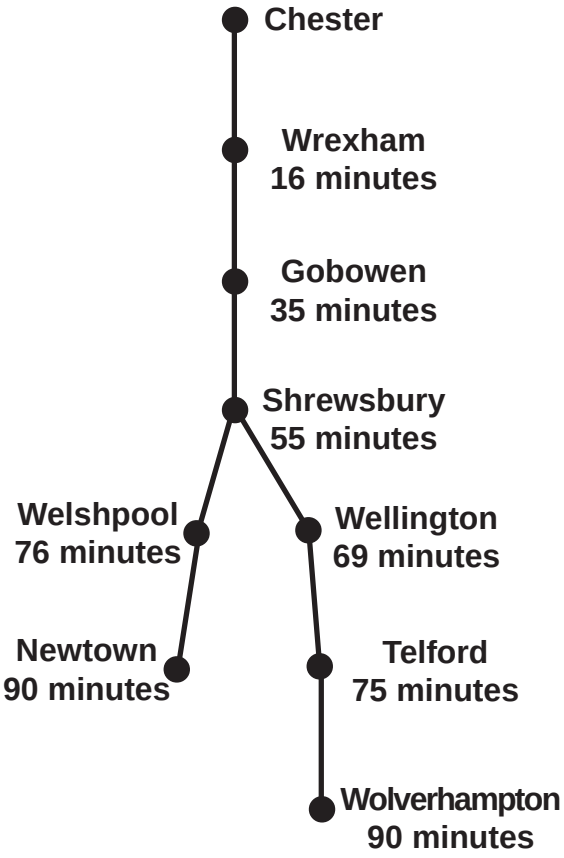
c) Alex travels to Euston.
She gets on the 07:24 train from Stoke.
How long will her journey take?

2) The train route diagram show the times it takes to travel from Chester to other major stations on the line.

Use the information in the diagram to complete the following timetables.

Chester	04:22
Wrexham	
Gobowen	
Shrewsbury	
Welshpool	
Newtown	

Wolverhampton	16:42
Telford	
Wellington	
Shrewsbury	
Gobowen	
Wrexham	
Chester	



N22a Real-Life Problems Without a Calculator

1) Which four coins make a total of 77p?

2) Six bars of metal each weigh 2.75 kg.
How much do they weigh altogether?

3) At a party for 171 people, 9 guests sat at each table.
How many tables were there?

4) Coke cans cost 43p each.
How many cans you buy with £6?

5) Olivia went to a cafe.
She ordered:

2 sausages
Baked beans
3 coffee
1 juice

She paid with a £5 note.
Work out how much change she got.

N22a Real-Life Problems Without a Calculator

1) Cheese is on offer at £3.26 per kilogram.
Emma buys half a kilogram.

How much change does she receive from a £10 note?

2) A mug and a plate together cost £2.90.
The mug cost 40p more than the plate.

How much does the plate cost?

3) A man is 27 cm taller than his son, who is 8 cm shorter than his mother. The man was born 42 years ago and is 1.78 m tall.

How tall is his wife?

4) A bus starts at Birmingham and makes three stops before reaching London.

At Birmingham, 37 people get on.
At Rugby, 13 people get off and 6 get on.
At Willen, 9 people get off and 15 get on.
At Luton, 24 people get off and 8 get on.

How many people are on the bus when it reaches London?

N22b Real-Life Problems With a Calculator

1) There are 7 people in a team.
How many teams can you make from 131 people?

2) A motorist bought 26 litres of petrol at £1.19 per litre.
   a) How much did it cost?
   b) What change did he get from £50?

3) A museum trip is organised for 57 members of a youth club. They go in minibuses that can each seat up to 15 people.
It costs £42.50 for each minibus and £172 for the group to access the museum.
How much will the trip cost per person?

4) Mars Bars cost 35p. Skittles cost 45p.
Gillian bought 5 bags of Skittles and some Mars Bars.
She paid with a £5 note and received 30p change.
How many Mars Bars did she buy?

N22b Real-Life Problems With a Calculator

1) Three consecutive integers have a sum of 105.
What are they? ___ ___ ___

2) Using the brackets keys of your calculator,

work out the following.

a) 164 – (27 + 56) = _____

b) 44.8 ÷ (15.4 – 9.8) = _____

c) (19.8 – 3.3) ÷ (31.2 – 16.2) = _____

d) (8 × 14.4) ÷ (11.1 – 4.7) = _____

3) If you start with 16 and press the square root key of your calculator ($\sqrt{\ }$) twice, the answer given is 2.

If you start with 81 and press the square root key of your calculator ($\sqrt{\ }$) twice, the answer given is 3.

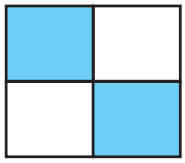
Complete the following sentences:

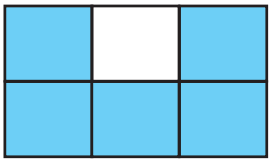
a) If you start with 1296 and press the square root key of your calculator twice,the answer given is _____ .

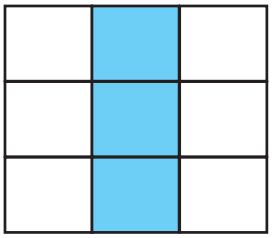
b) If you start with _____ and press the square root key of your calculator twice, the answer given is 5 .

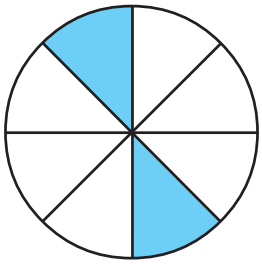
N23a Introduction to Fractions Shading

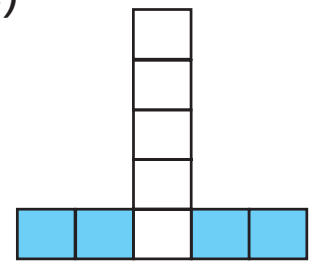
1) What fractions of the following shapes are shaded?

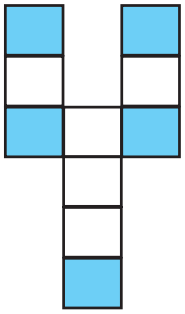
a) 

b) 

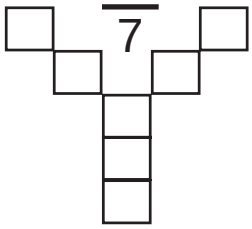
c) 

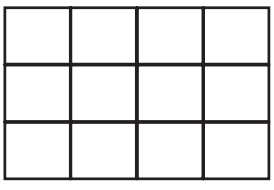
d) 

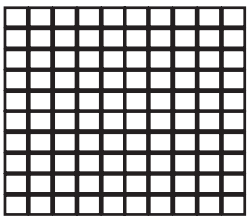
e) 

f) 

2) Shade the shapes according to the given fractions.

a) $\frac{5}{7}$ 

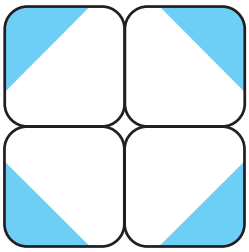
b) $\frac{1}{3}$ 

c) $\frac{25}{100}$ 

N23a Introduction to Fractions Shading

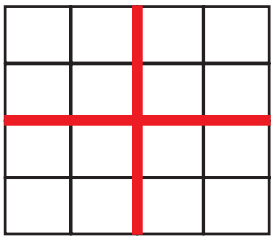
1) $\frac{1}{3}$ of this shape is shaded.

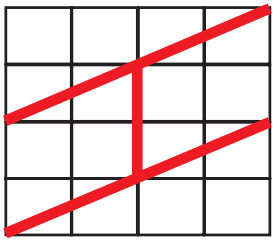
a) What fraction of this diagram is shaded?

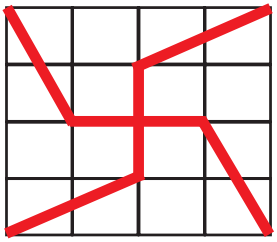


b) What fraction of this diagram is shaded?

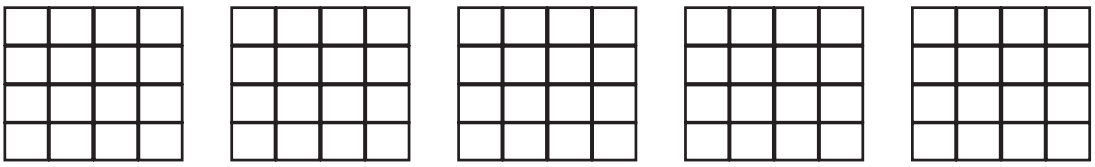
2) These rectangles have been split into four equal pieces.







Split each of these rectangles into four equal pieces in different ways.



N23b Introduction to Fractions Equivalent Fractions

1) Find three equivalent fractions to each of the following:

a) $\frac{1}{3}$ b) $\frac{1}{4}$ c) $\frac{1}{5}$

d) $\frac{2}{5}$ e) $\frac{3}{4}$ f) $\frac{5}{8}$

2) Fill in the missing number in each of these equivalent fractions.

a) $\frac{2}{3} = \frac{\square}{9}$ b) $\frac{1}{5} = \frac{\square}{20}$ c) $\frac{3}{11} = \frac{\square}{22}$

d) $\frac{1}{3} = \frac{5}{\square}$ e) $\frac{2}{7} = \frac{10}{\square}$ f) $\frac{4}{9} = \frac{8}{\square}$

g) $\frac{2}{5} = \frac{\square}{50}$ h) $\frac{5}{7} = \frac{\square}{42}$ i) $\frac{9}{10} = \frac{81}{\square}$

3) Complete the following equivalent fraction series.

a) $\frac{1}{2} = \frac{2}{\square} = \frac{\square}{6} = \frac{5}{\square} = \frac{\square}{20} = \frac{50}{\square}$

b) $\frac{3}{5} = \frac{6}{\square} = \frac{\square}{15} = \frac{12}{\square} = \frac{\square}{50} = \frac{300}{\square}$

N23b Introduction to Fractions Equivalent Fractions

1) Here are six number cards.

2	4	6	8	10	12

a) Choose two of these six cards to make a fraction that is equivalent to $\frac{1}{6}$.

$\frac{\square}{\square}$

b) Choose two of these six cards to make a fraction that is equivalent to $\frac{12}{16}$.

$\frac{\square}{\square}$

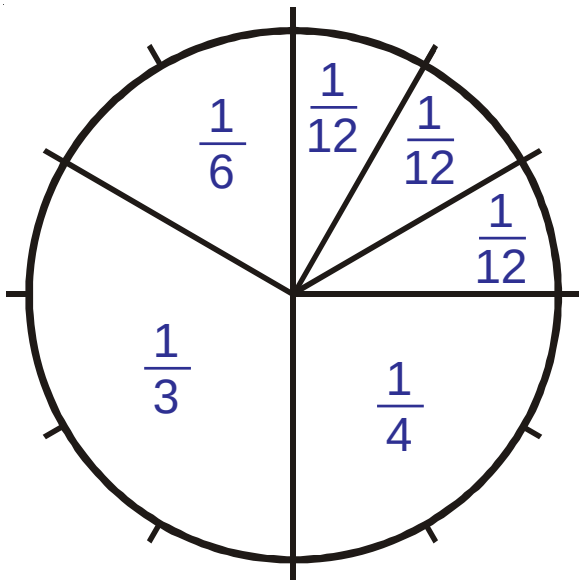
2) Use the diagram below to help you fill in the missing numbers.

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

b) $\frac{1}{6} = \frac{\square}{\square} - \frac{1}{12}$

c) $\frac{1}{6} + \frac{2}{12} = \frac{\square}{\square}$

d) $\frac{1}{3} + \frac{1}{6} = \frac{1}{4} + \frac{\square}{\square}$



N23c Introduction to Fractions Simplifying

1) Cancel each of these fractions to their simplest form:

a) $\frac{2}{6}$ b) $\frac{5}{10}$ c) $\frac{3}{12}$

d) $\frac{2}{16}$ e) $\frac{9}{27}$ f) $\frac{20}{80}$

2) Cancel each of these fractions to their simplest form:

a) $\frac{4}{14}$ b) $\frac{30}{70}$ c) $\frac{16}{34}$

d) $\frac{24}{42}$ e) $\frac{27}{45}$ f) $\frac{28}{36}$

3) Cancel down fully each of these fractions:

a) $\frac{33}{55}$ b) $\frac{72}{96}$ c) $\frac{45}{90}$

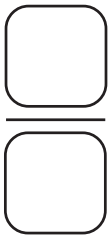
d) $\frac{75}{100}$ e) $\frac{40}{180}$ f) $\frac{68}{116}$

N23c Introduction to Fractions Simplifying

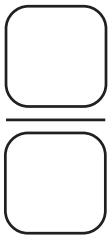
Here are six number cards.

2	5	9	7	4	11

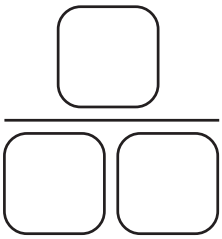
a) Choose two of these six cards to make a fraction that is equal to $\frac{45}{99}$.



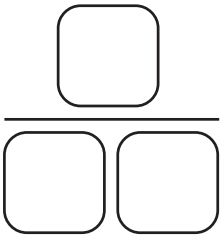
b) Choose two of these six cards to make a fraction that is equal to $\frac{112}{144}$.



c) Choose three of these six cards to make a fraction that is equal to $\frac{28}{175}$.

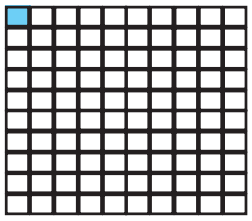


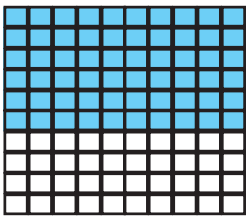
d) Choose three of these six cards to make the smallest possible fraction.

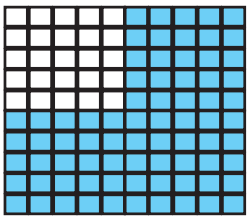


N24a Percentages Introduction

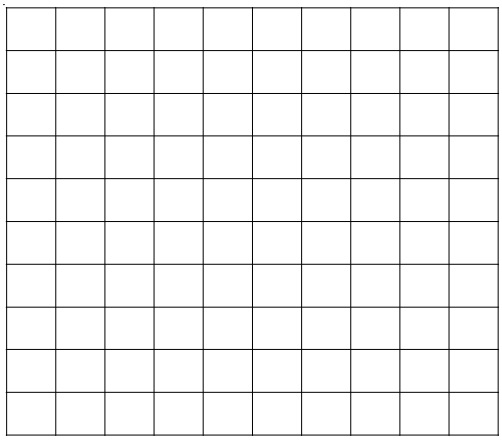
1) What percentage of the shapes below are shaded?

a) 

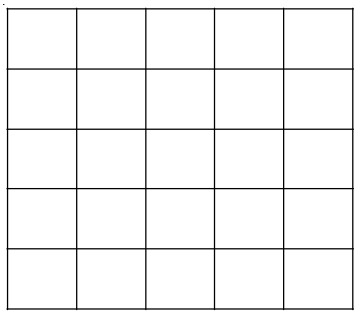
b) 

c) 

2) Shade in 45% of this grid.



3) Shade in 32% of this grid.



N24b Percentages
Percentage of an Amount

1) Work out the following:

a) 50% of 80

b) 50% of 48

c) 50% of 15

d) 25% of 120

e) 25% of 90

2) Work out the following:

a) 10% of 150

b) 10% of 26

c) 50% of 12

d) 25% of 12

e) 75% of 12

3) Work out the following:

a) 10% of £40

b) 5% of £40

c) 15% of £40

d) 5% of £70

e) 15% of £380

4) Work out the following:

a) 20% of £50

b) 45% of £9

c) 80% of £11

d) 35% of £6

e) 65% of £824

5) Jamie received £26 pocket money last week.

He spent it as follows: __ 10% on sweets,

__ 25% on magazines

__ 15% on games

How much did Jamie have left?
Show your working.

6) Tony had £40 saved up and gave 35% of it to his younger sister, Ella.

Ella gave 20% of what she was given to her younger brother, Ben.

Ben gave 30% of what he was given to his younger brother, Tim.

Tim spent 75% of what he was given on buying a toy for his hamster, Hammy.

How much was the toy for Hammy?

N25 Powers and Roots

1) a) Shade all the square numbers in the grid.

b) Put a circle round all the cube numbers in the grid.

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	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70	71	72
73	74	75	76	77	78	79	80	81	82	83	84
85	86	87	88	89	90	91	92	93	94	95	96
97	98	99	100	101	102	103	104	105	106	107	108
109	110	111	112	113	114	115	116	117	118	119	120
121	122	123	124	125	126	127	128	129	130	131	132
133	134	135	136	137	138	139	140	141	142	143	144

2) a) What is the square root of 169?

b) What is the cube root of 64?

3) Add together the square root of 81 with the cube root of 216.
Now, square the result.
What is your final answer?

N26 Function Machines and Inverse Operations

1) Find the **output** for each of these function machines.

a) 3 → × 5 →

b) 7 → + 5 →

c) 6 → × 2 → – 3

d) 13 → + 5 → ÷ 3

e) 10 → ÷ 2 → – 7

f) 7 → – 4 → × 2.5

2) Find the **input** for each of these function machines.

a) → – 5 → 8

b) → ÷ 4 → 25

c) → × 2 → – 1 → 19

d) → ÷ 5 → + 8 → 18

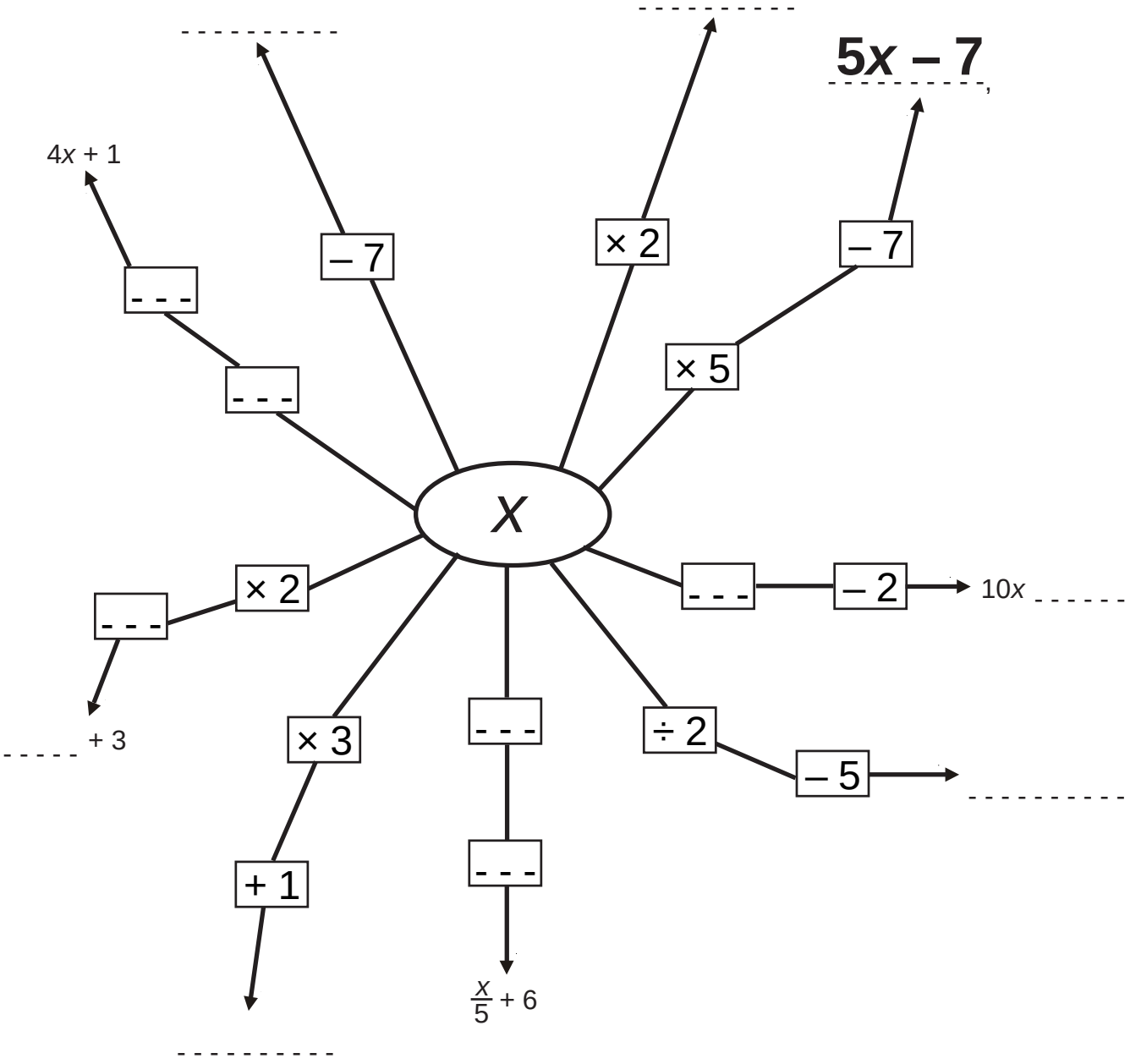
e) → – 7 → ÷ 2 → 3.5

f) → × 19 → – 4 → -4

N26 Function Machines and Inverse Operations

Complete the diagram below. Every time you see dashes like this - - - - - - - - - - , you need to write the correct number or expression.

One of them (**5*x* – 7**) has already been done for you.



N27a Rounding
Nearest 10, 100, 1000

Using a calculator, work out the following.
Give your answers to the nearest 10.

a) 24 × 14

b) 383 × 43

c) 4088 ÷ 56

d) 265364 ÷ 326

e) (42000 + 768) ÷ 54

N27b Rounding Decimal Places

Round the following numbers to 1 decimal place.

a) 4.21

b) 53.43

c) 31.59

d) 8.827

e) 0.653

f) 578.48

g) 79.035

h) 3443.77052

i) 26.9999

j) 99.961

N27b Rounding Decimal Places

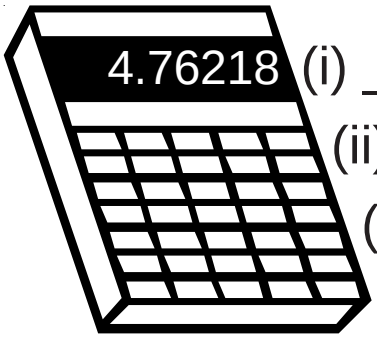
Round each of the numbers on the calculators to

(i) 1 d.p.

(ii) 2 d.p.

(iii) the nearest whole number.

1)

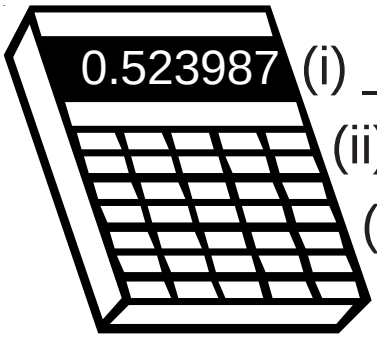


(i) ____

(ii) ____

(iii) ____

2)

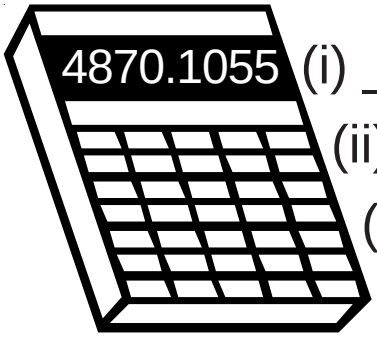


(i) ____

(ii) ____

(iii) ____

3)

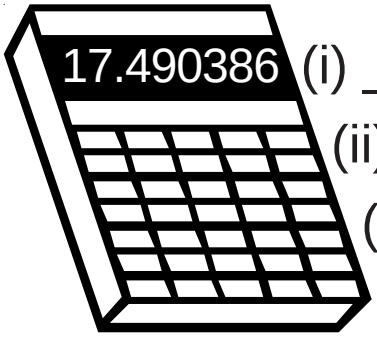


(i) ____

(ii) ____

(iii) ____

4)

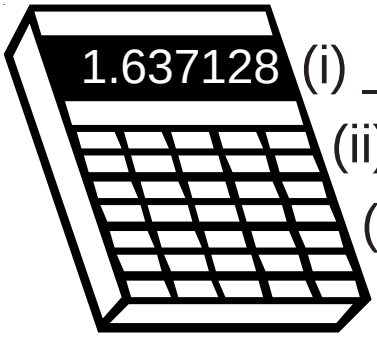


(i) ____

(ii) ____

(iii) ____

5)

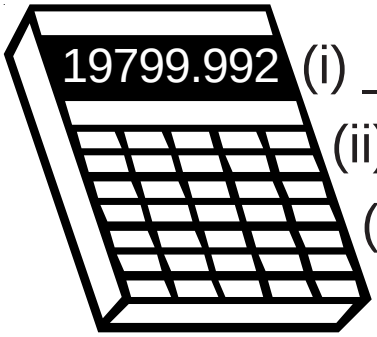


(i) ____

(ii) ____

(iii) ____

6)



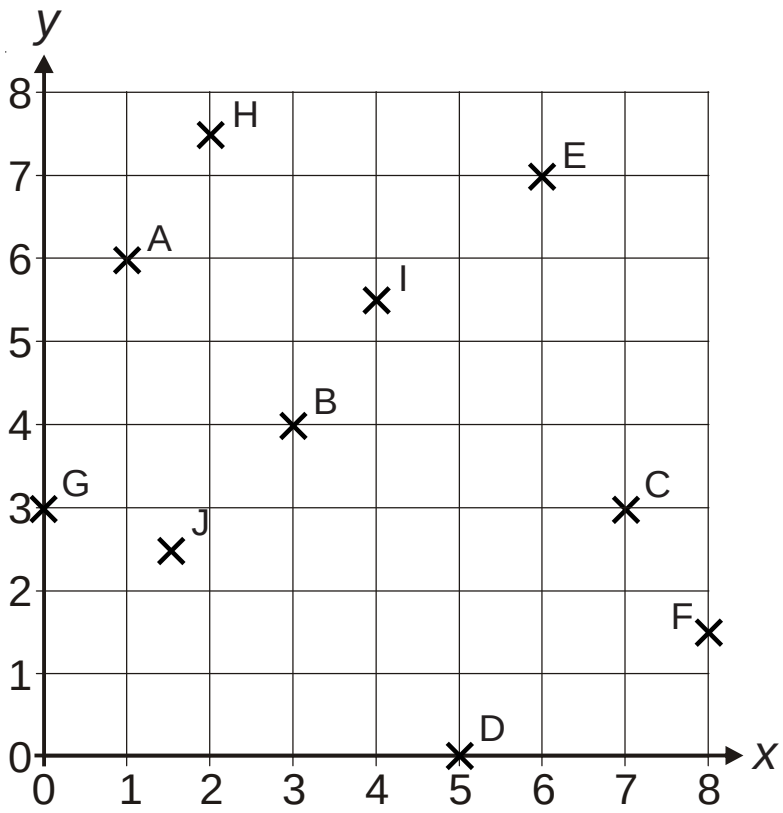
(i) ____

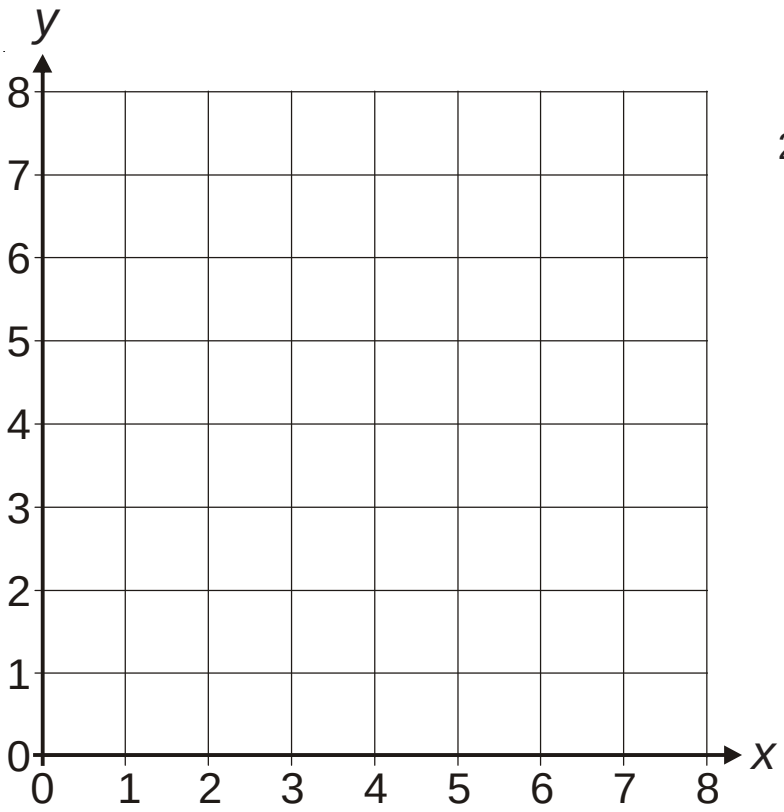
(ii) ____

(iii) ____

A1a Coordinates - First Quadrant

1) Write down the coordinates of the crosses labelled A to J.





2) Put crosses at the following points and label them with the correct letters.

A (3, 7)

B (8, 4)

C (2, 5)

D (6, 0)

E (2.5, 3)

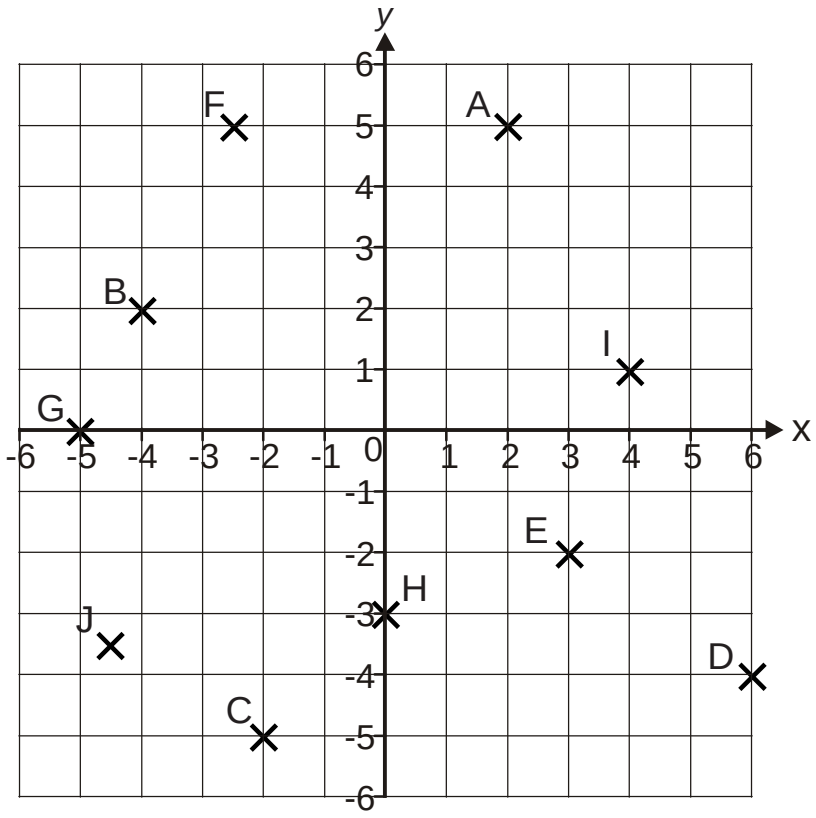
F (0, 6.5)

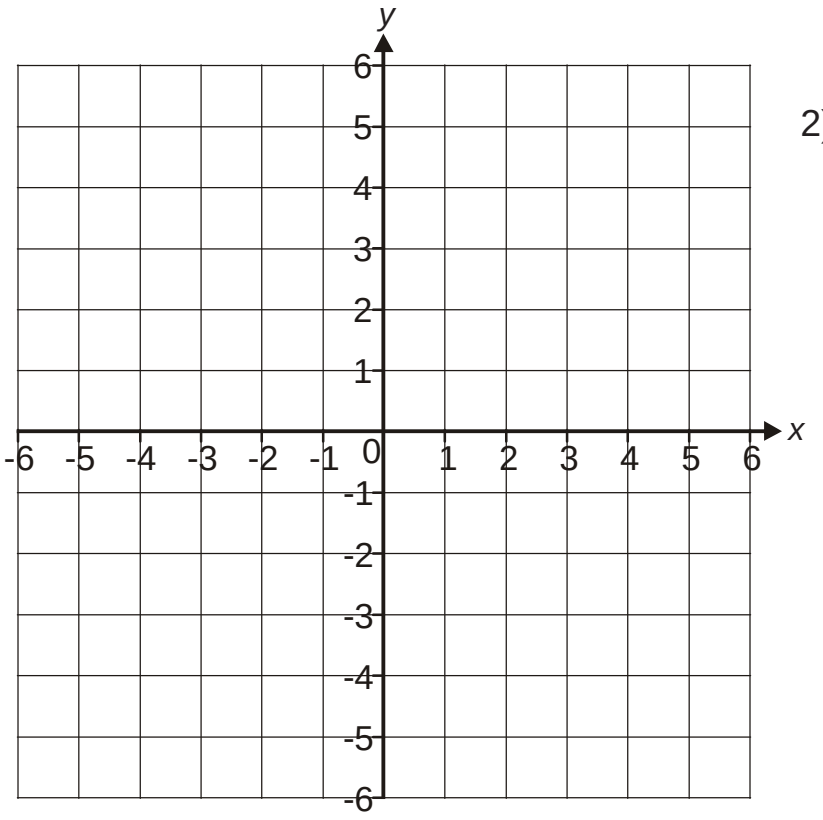
G (5.5, 7.5)

H (8, 8)

A1b Coordinates - All 4 Quadrants

1) Write down the coordinates of the crosses labelled A to J.





2) Put crosses at the following points and label them with the correct letters.

A (-5, 3)

B (2, -4)

C (-2, -6)

D (5.5, 3)

E (0, 0)

F (-3, 0)

G (-6, -5)

H (0, -5)

A1b Coordinates - All 4 Quadrants

1) Below there are seven well-known phrases or expressions.
Expression (a) is “Clean underwear”.
Try and work out the other six.

(a)

WEAR
CLEAN

(b)

POTOOOOOOOO

(c)

DR doo

(d)

HOROBOD

(e)

O _ E R _ T _ O _

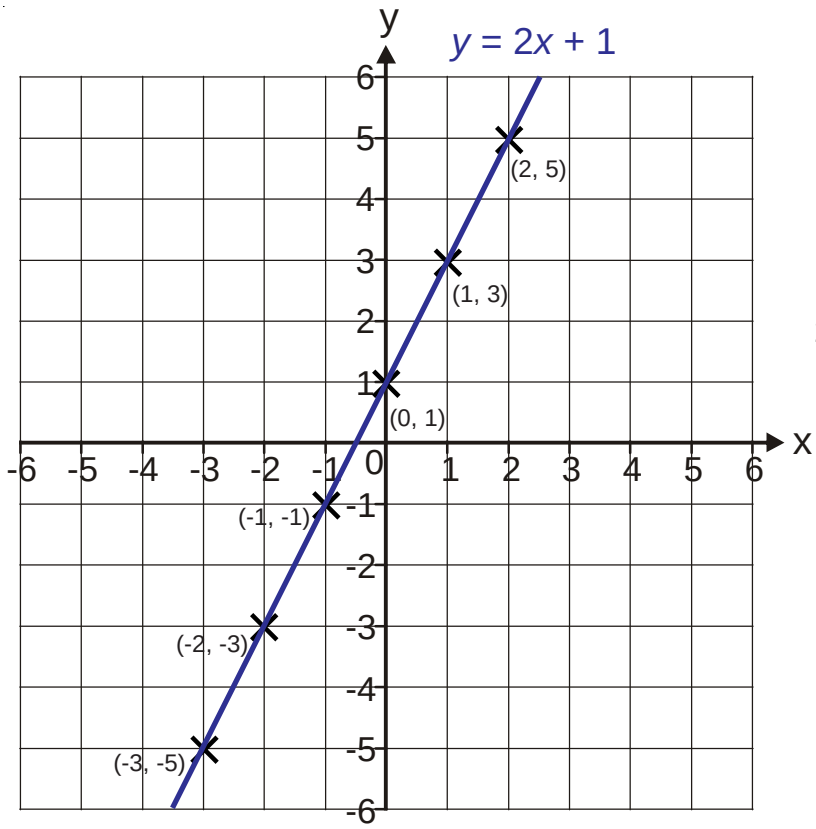
(f)

XMASCARA

(g)

must get here
must get here
must get here

Every question on this page can be answered if you just see them in the right way.



For every point on the line if you multiply the x coordinate by 2 and then add 1 you always get the y coordinate.
This is why we call the line $y = 2x + 1$

2) Plot the following points on the grid, draw a line through the points and try and work out the name of the line.

a) (6, 6), (5, 5), (4, 4), (3, 3), (2, 2)
(1, 1), (0, 0), (-1, -1), (-2, -2)
(-3, -3), (-4, -4), (-5, -5), (-6, -6)

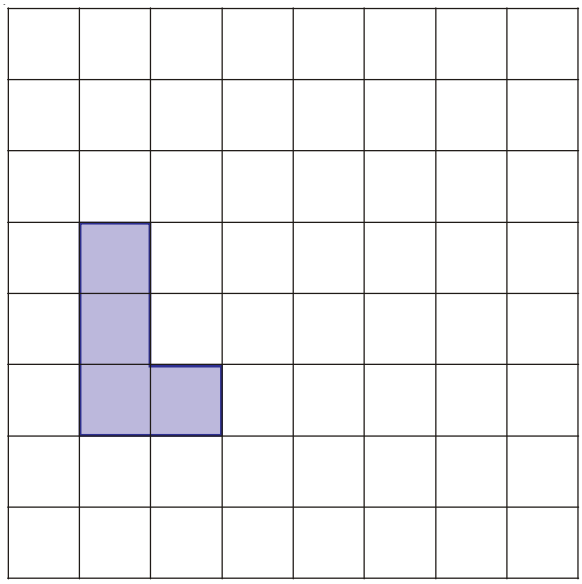
b) (6, 3), (4, 2), (2, 1), (0, 0), (-6, -3)

c) (4, 5), (3, 3), (2, 1), (1, -1), (-1, -5)

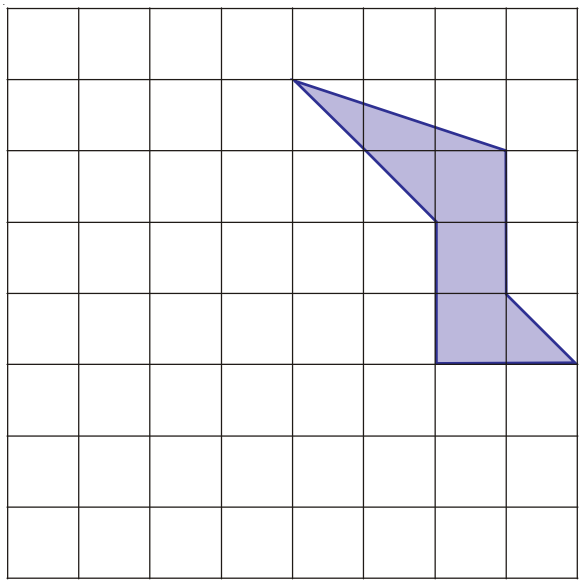
d) (5, 6), (5, 5), (5, 4), (5, 3), (5, 2)
(5, 1), (5, 0), (5, -1), (5, -2), (5, -6)

G5 Translation

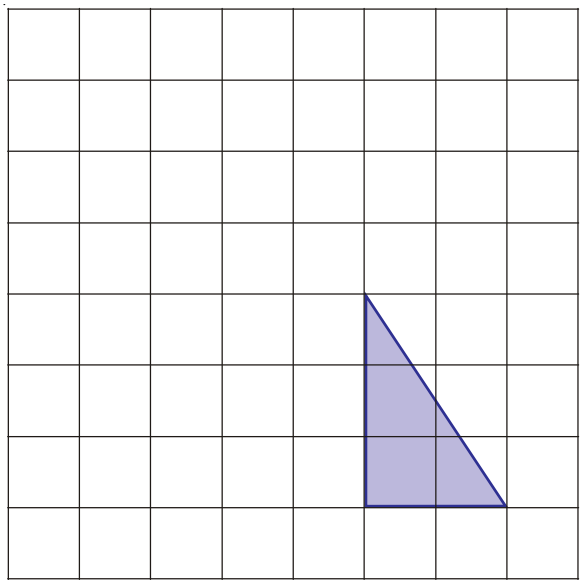
1) Translate the shape 5 squares to the right and 2 squares up.



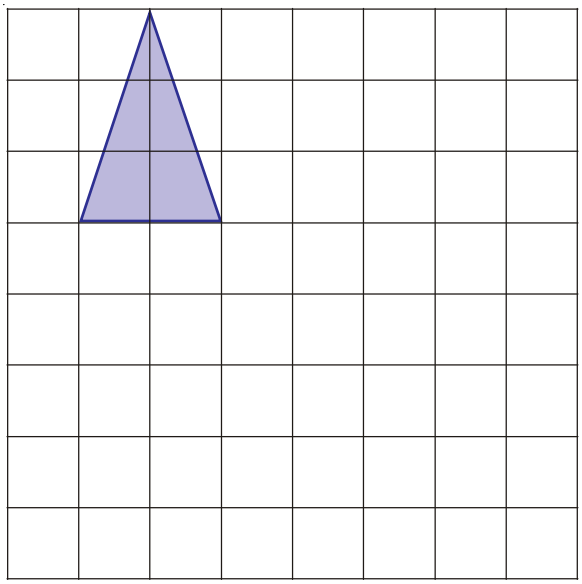
2) Translate the shape 3 squares to the left and 2 squares down.



3) Translate the shape with vector $\begin{pmatrix} -4 \\ 3 \end{pmatrix}$



4) Translate the shape with vector $\begin{pmatrix} 4 \\ -5 \end{pmatrix}$



G5 Translation

Use tracing paper and translate the following shapes.

A with vector $\begin{pmatrix} -3 \\ -2 \end{pmatrix}$

B with vector $\begin{pmatrix} 2 \\ 3 \end{pmatrix}$

C with vector $\begin{pmatrix} 1 \\ -4 \end{pmatrix}$

D with vector $\begin{pmatrix} 2 \\ 0 \end{pmatrix}$

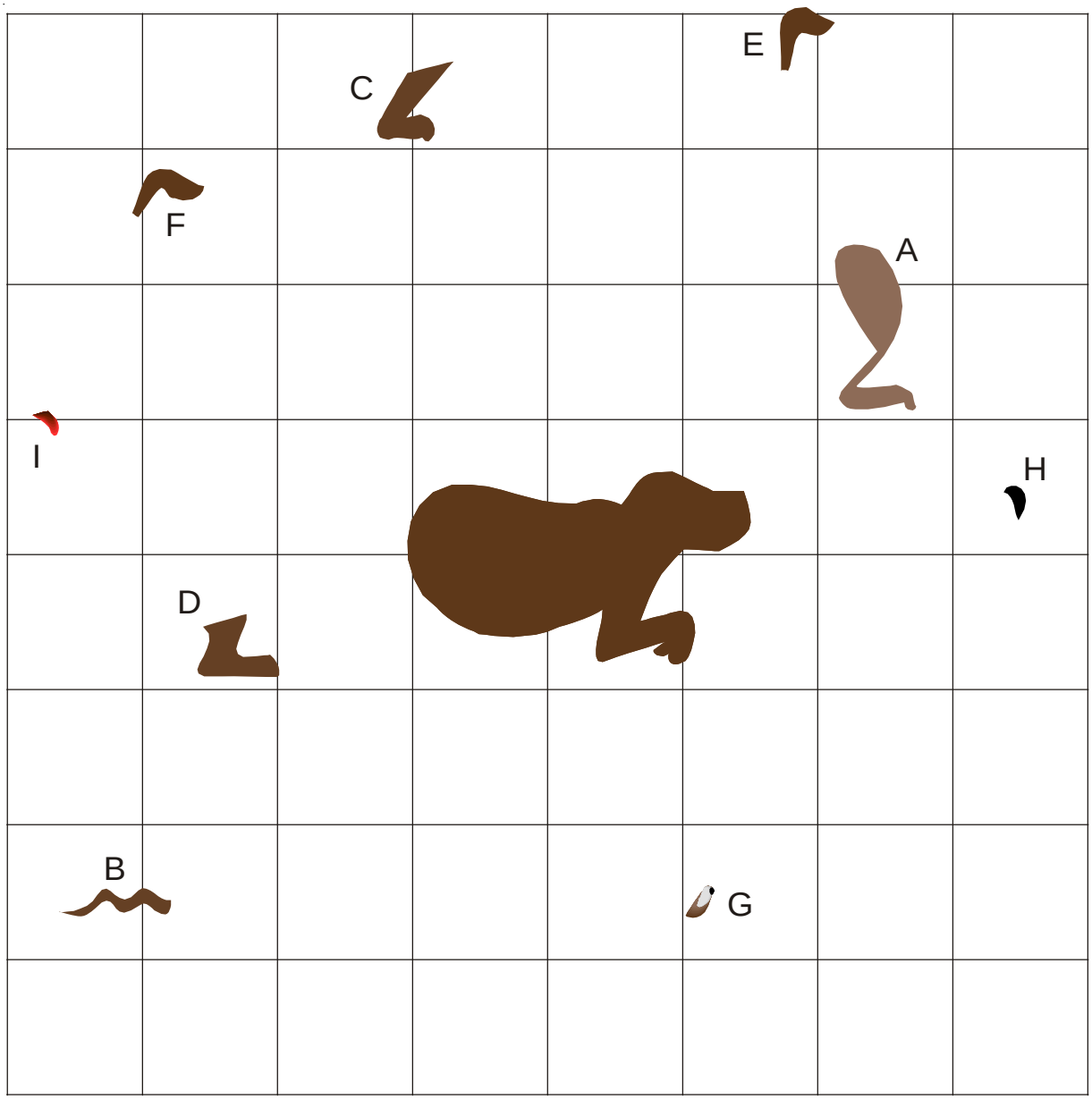
E with vector $\begin{pmatrix} -1 \\ -3 \end{pmatrix}$

F with vector $\begin{pmatrix} 4 \\ -2 \end{pmatrix}$

G with vector $\begin{pmatrix} 0 \\ 3 \end{pmatrix}$

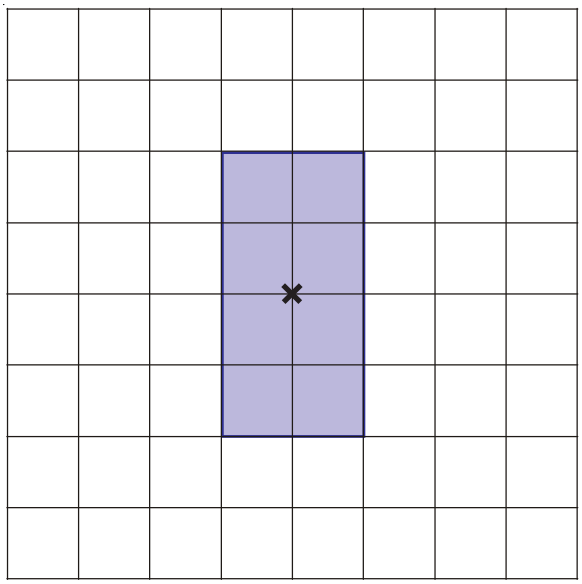
H with vector $\begin{pmatrix} -2 \\ 0 \end{pmatrix}$

I with vector $\begin{pmatrix} 5 \\ -1 \end{pmatrix}$

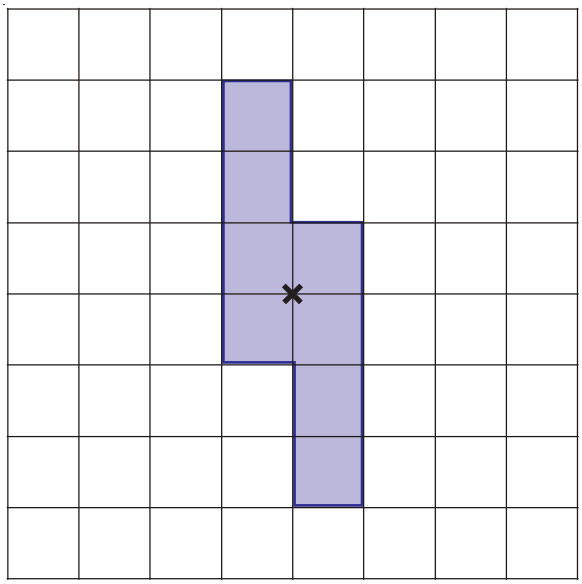


G6 Rotation

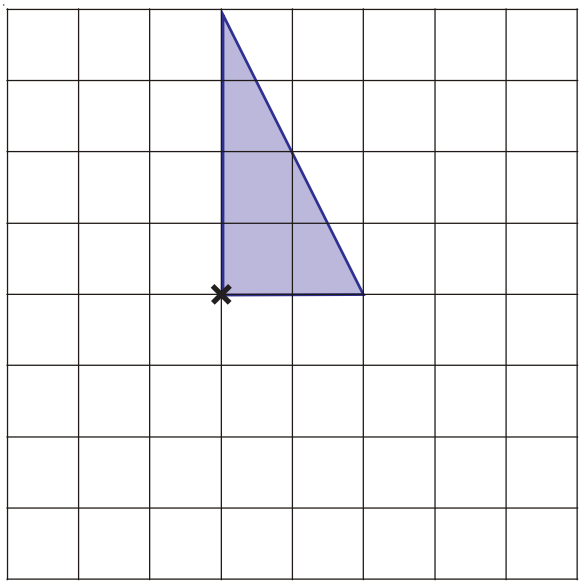
1) Rotate the shape 90° about the cross.



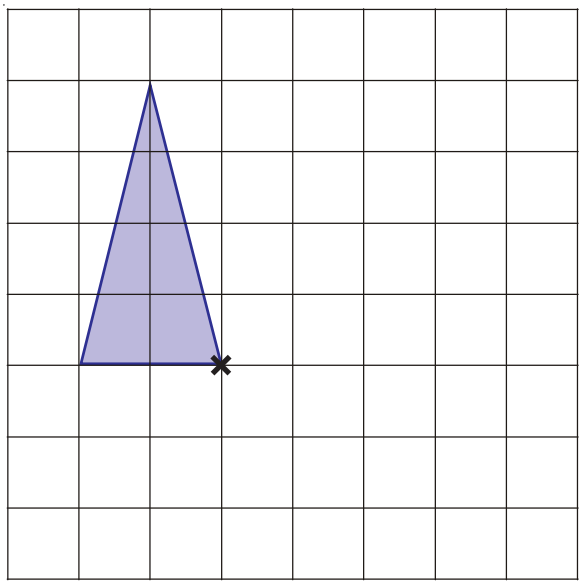
2) Rotate the shape 90° about the cross.



3) Rotate the shape 180° about the cross.



4) Rotate the shape 90° clockwise about the cross.



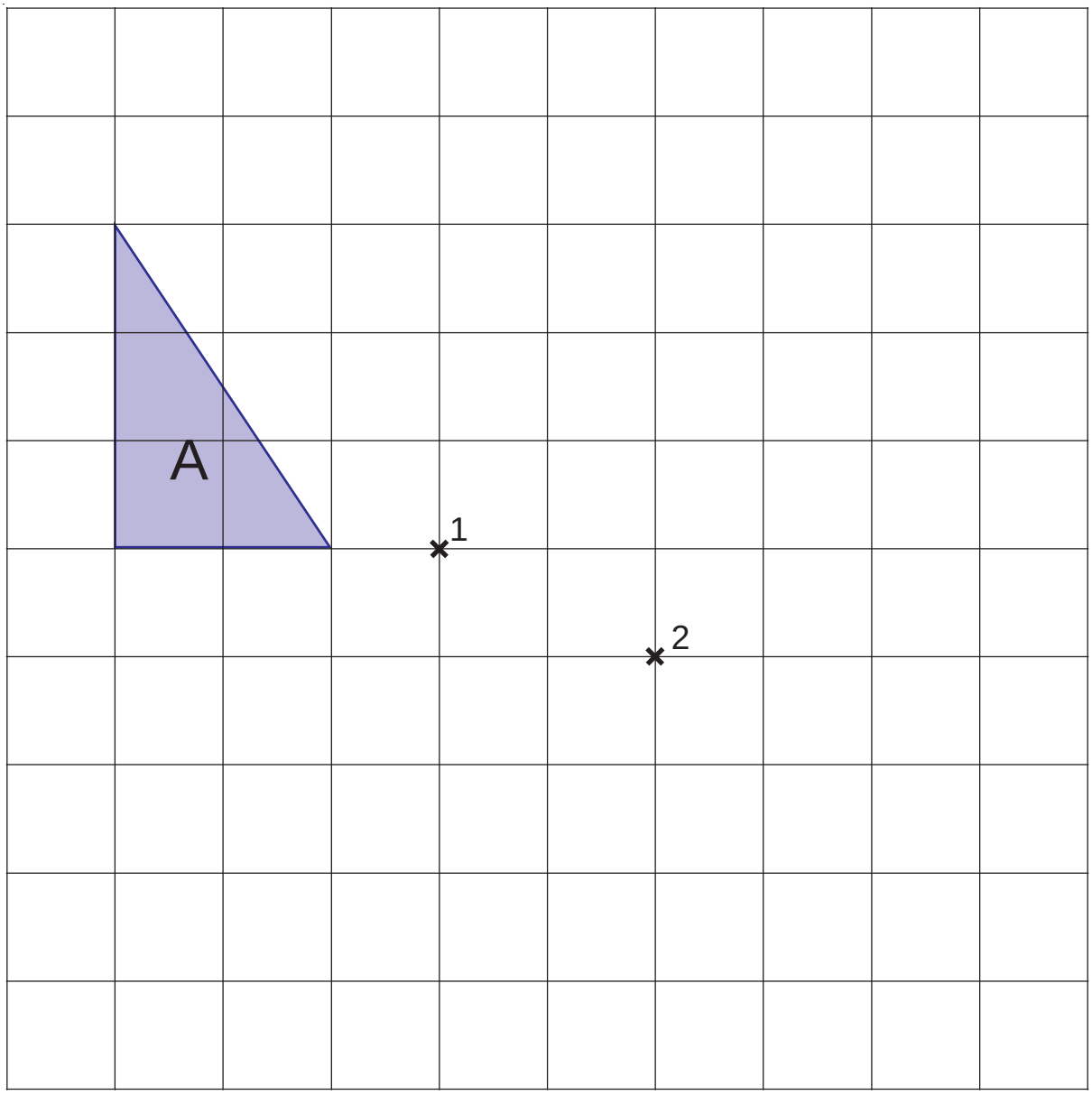
G6 Rotation

a) Rotate triangle A 90° clockwise about cross 1.
Label your new triangle B.

b) Rotate triangle B 90° clockwise about cross 2.
Label your new triangle C.

c) How many degrees would you need to rotate triangle A to get to triangle C?

d) Mark with a cross the centre of rotation to get from A to C.



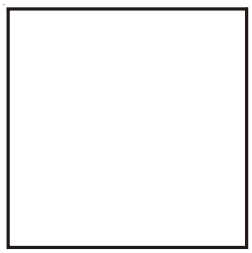
G7 Rotational Symmetry

1) *For figures a to h, work out*

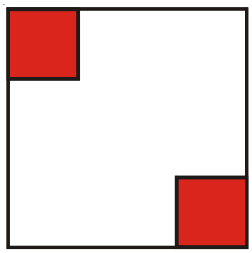
i) The order of rotational symmetry.

ii) How many lines of symmetry it has.

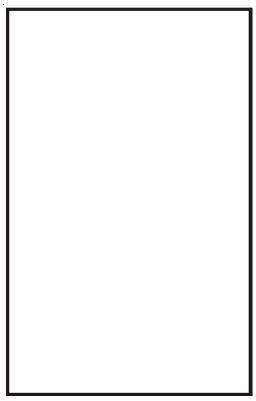
a)



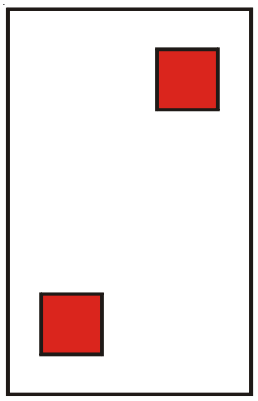
b)



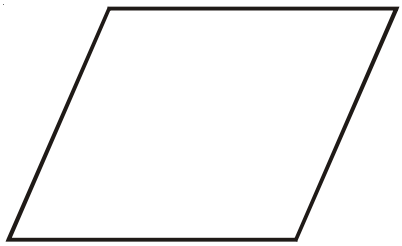
c)



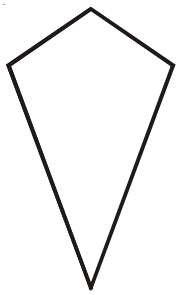
d)



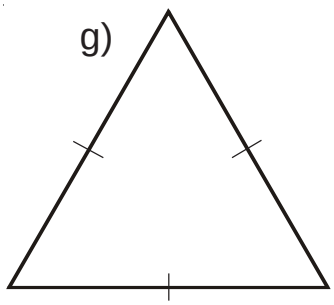
e)



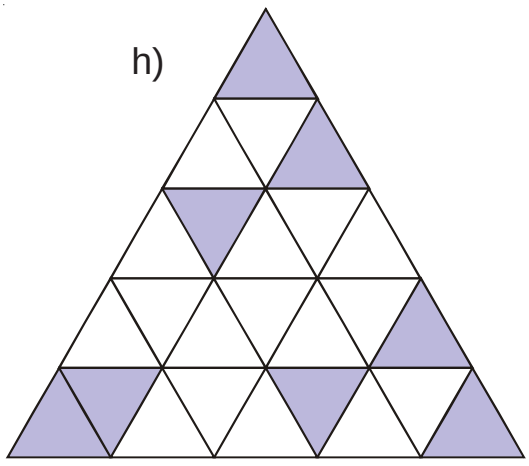
f)



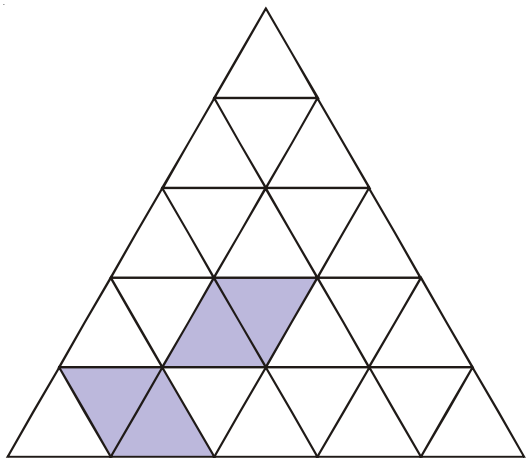
g)



h)

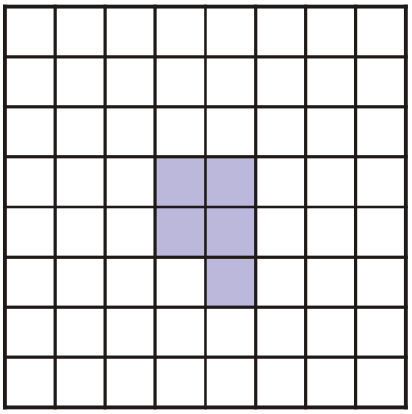


2) Shade in six more triangles so that this figure has rotational symmetry order 3

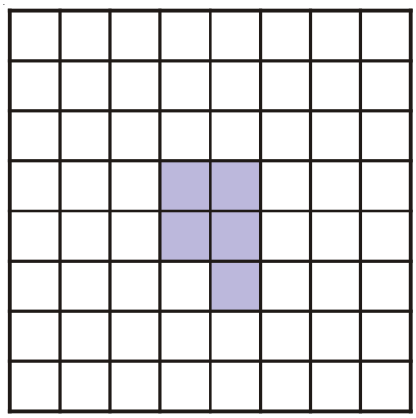


G7 Rotational Symmetry

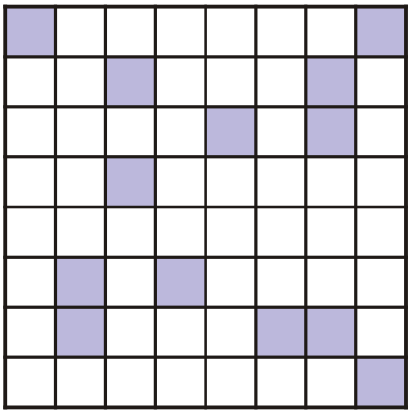
1) a) Shade in one square so that this shape has rotational symmetry of order 2.



b) Shade in a different square so that this shape has rotational symmetry of order 2.



2) Shade three more squares so that the grid has rotational symmetry of order 4.



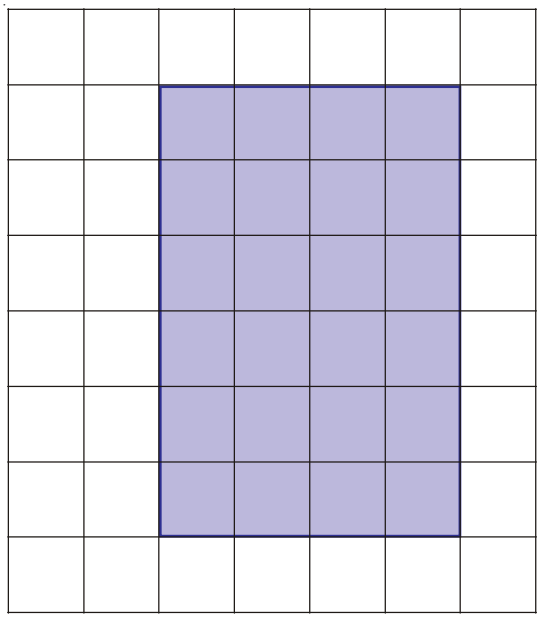
3) The diagram shows a poster which Chloe has on her wall.
When Chloe was standing on her head, looking in a mirror on the opposite wall at the poster on the wall behind her, how many letters could still be read the normal way?

CHLOE
BAXTER

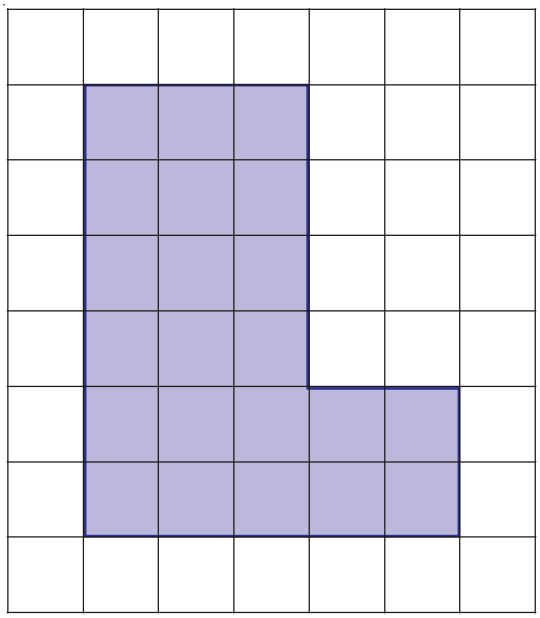
G8a

Perimeters
Counting Squares

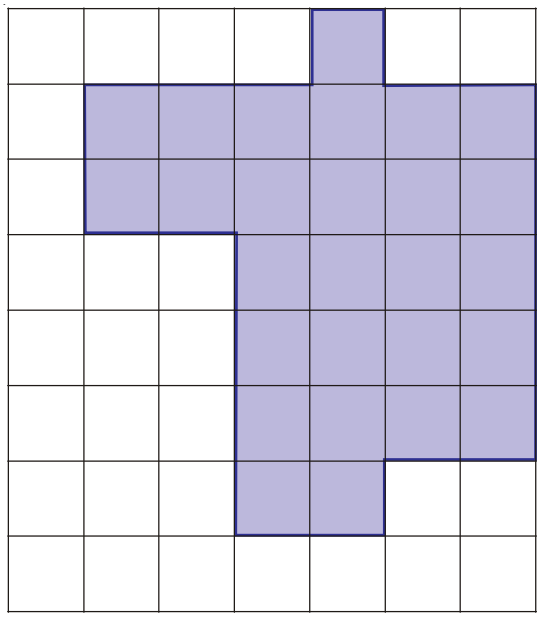
1) Find the perimeter of this rectangle on the cm grid.



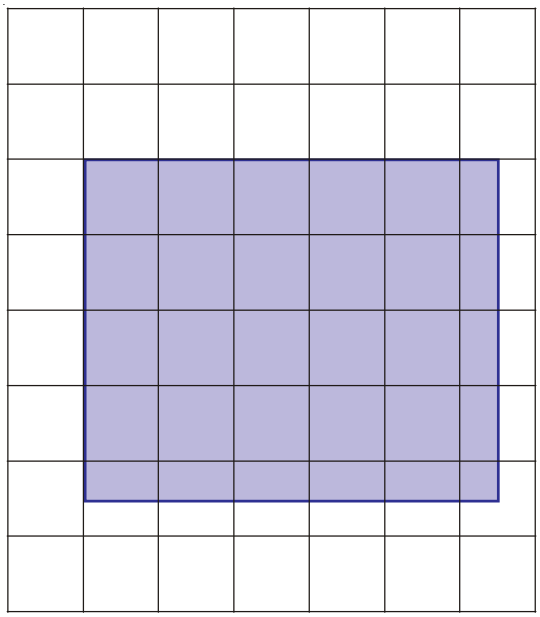
2) Find the perimeter of this shape on the cm grid.



3) Find the perimeter of this shape on the cm grid.



4) Find the perimeter of this shape on the cm grid.



G8a

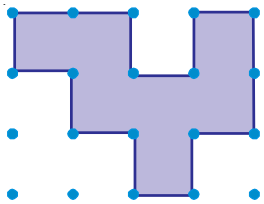
Perimeters
Counting Squares

On the dotty grid you can see a shape which has a perimeter of length 16 and an area of 7 squares.

Keeping the perimeter always 16, draw 9 more shapes which have areas of 8, 9, 10, 11, 12, 13, 14, 15 and 16 squares.

Perimeter = 16
Area = 7 squares

A



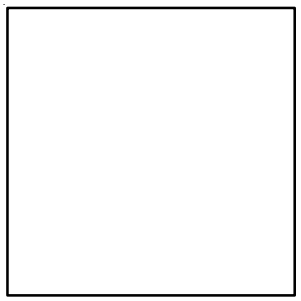
G8b

Perimeters
Using a Formula

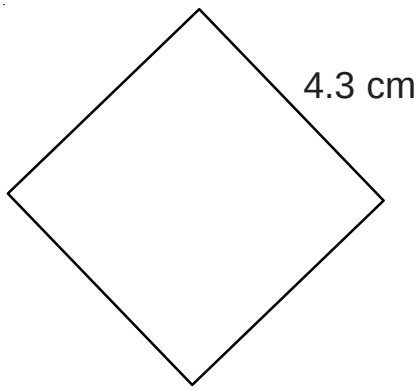
1) a) What is the formula for the perimeter of a square?

b) Use your formula to find the perimeter of the following squares.

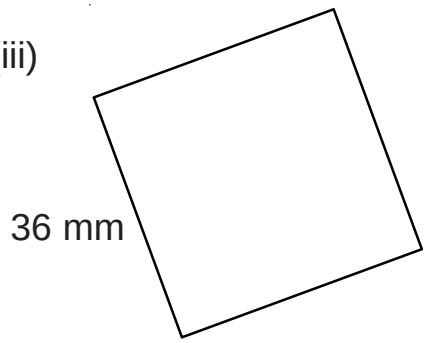
(i)



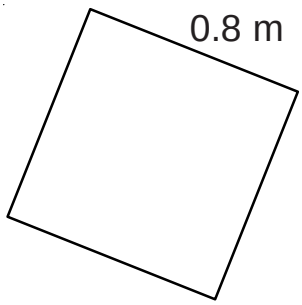
(ii)



(iii)



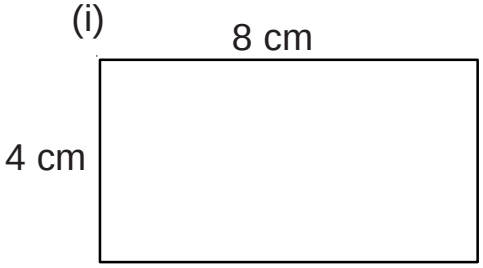
(iv)



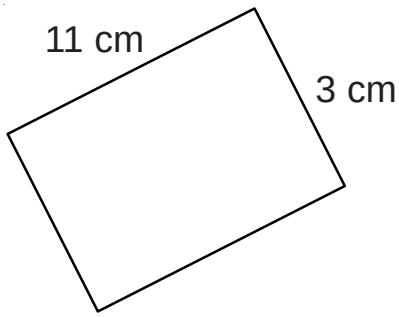
2) a) What is the formula for the perimeter of a rectangle?

b) Use your formula to find the perimeter of the following rectangles.

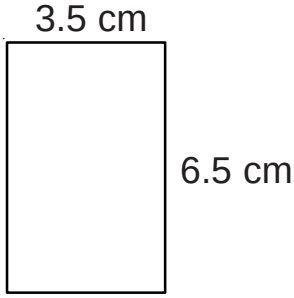
(i)



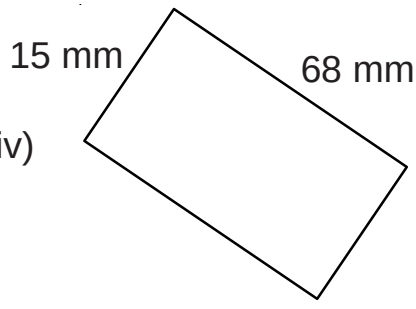
(ii)



(iii)



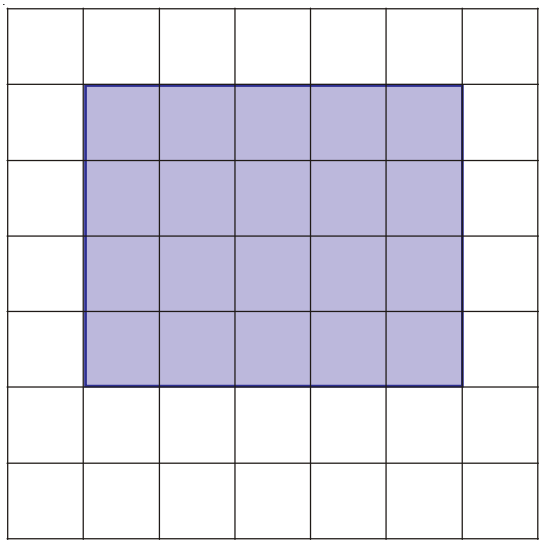
(iv)



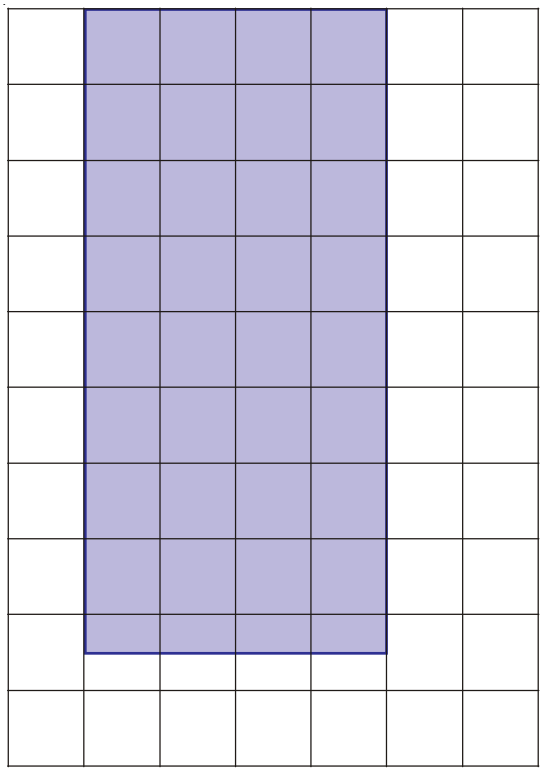
G9

Areas
Counting Squares

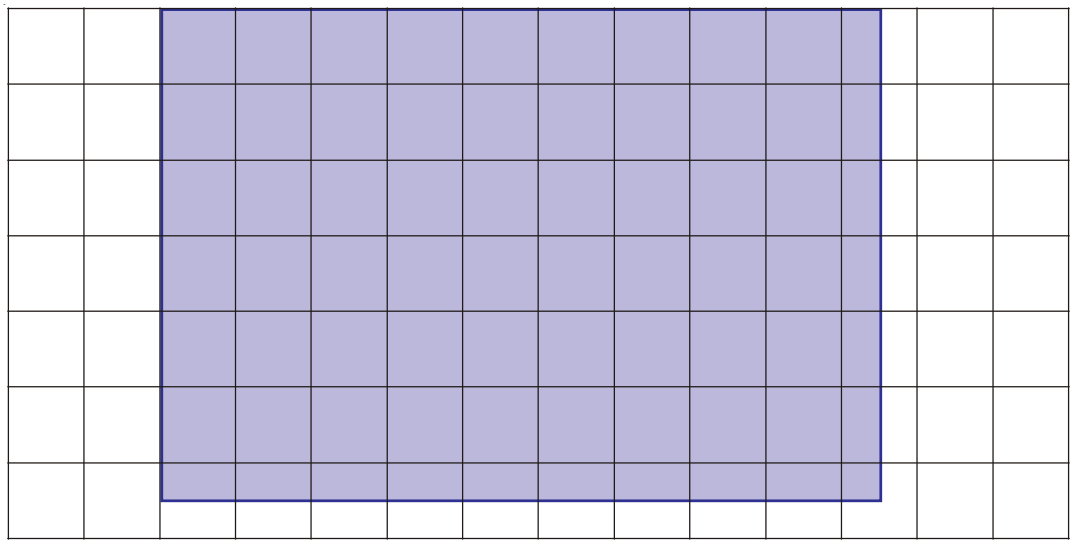
1) Find the area of the rectangle on this centimetre grid.



2) Find the area of the rectangle on this centimetre grid.



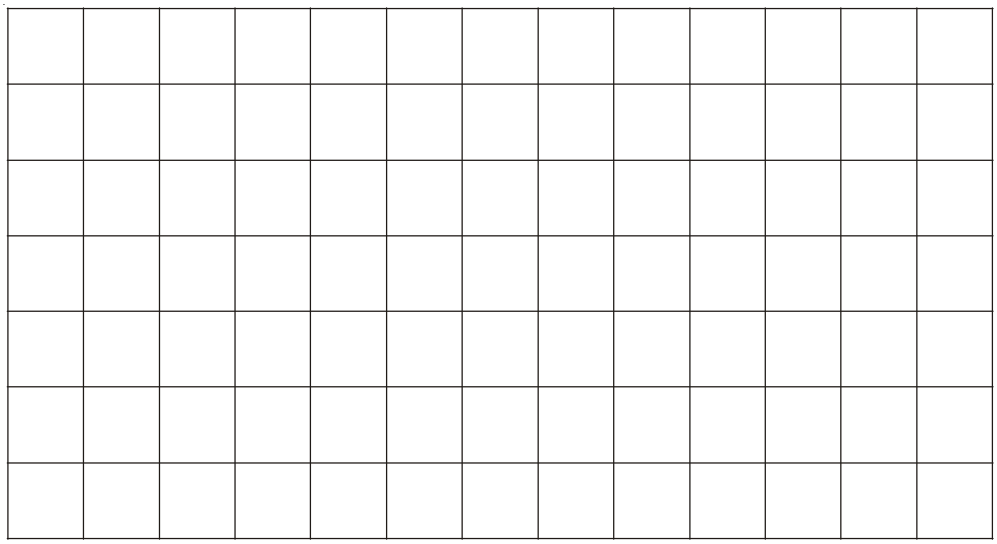
3) Find the area of the rectangle on this centimetre grid.



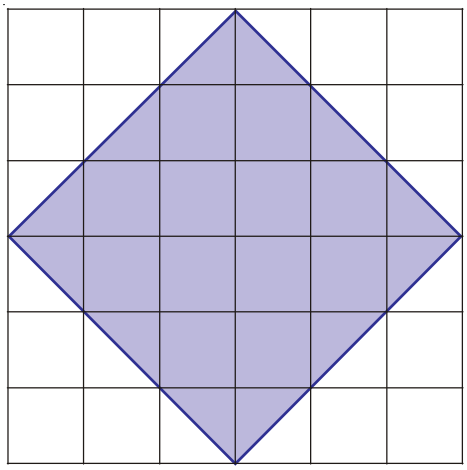
G9

Areas
Counting Squares

1) Draw three different-shaped rectangles with an area of 12cm^2 on the centimetre grid.

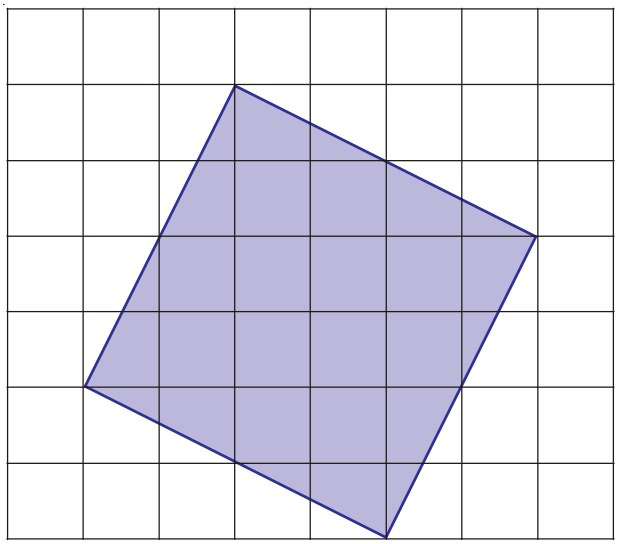


2) Find the area of the square on this centimetre grid.



This is a difficult question

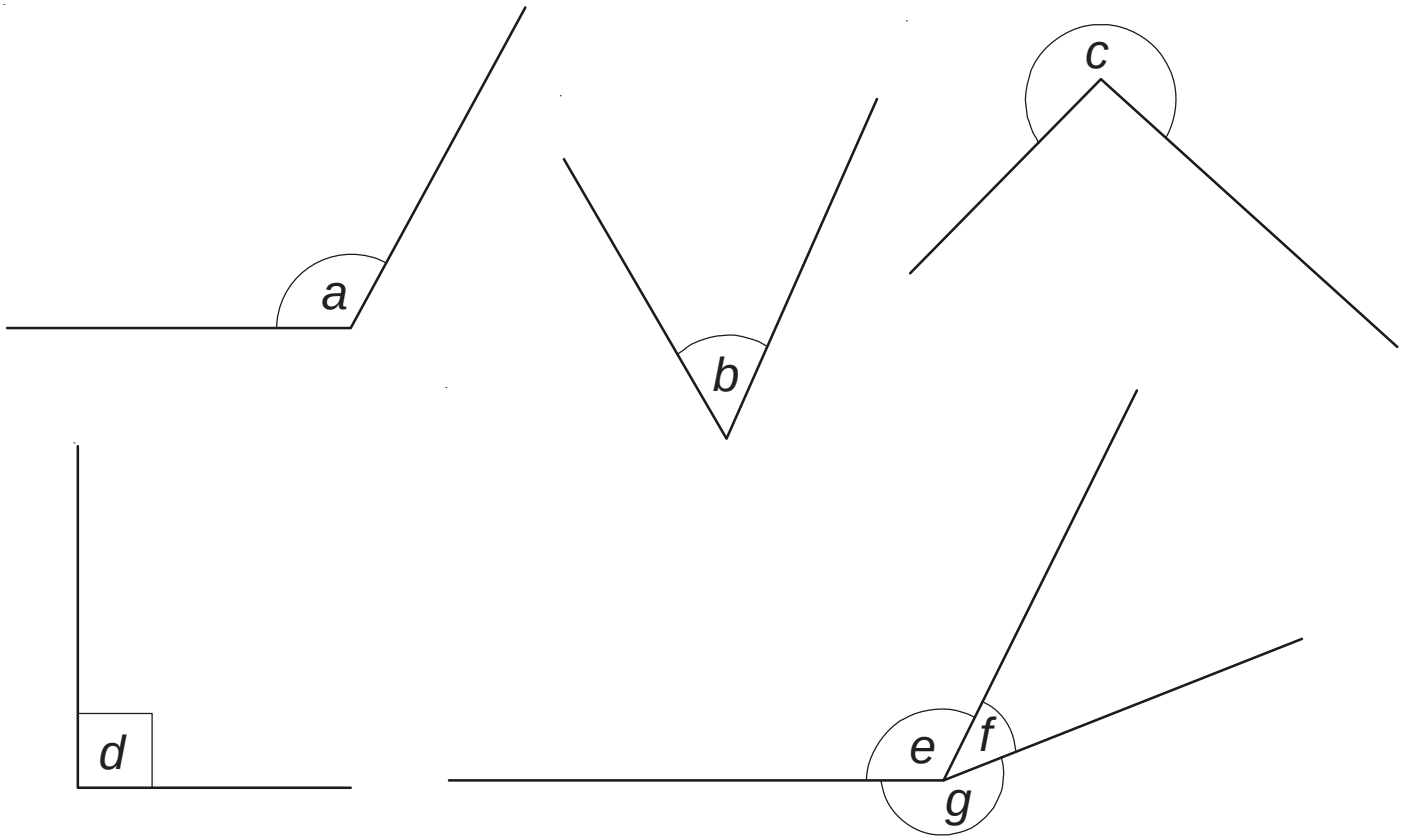
3) Find the area of the square on this centimetre grid.



G10a

Measuring and Drawing Angles
Introduction

1) Each of the angles below can be described as an acute angle, an obtuse angle, a reflex angle or a right angle.
Decide which each of them are.



2) a) Draw a triangle which has three acute angles.

b) Draw a triangle which has one obtuse angle and two acute angles.

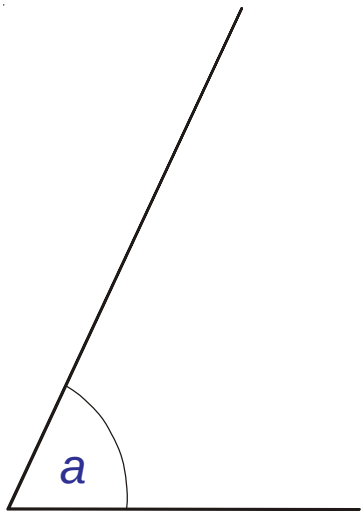
c) Draw a quadrilateral (4-sided shape) which has one reflex angle and three acute angles.

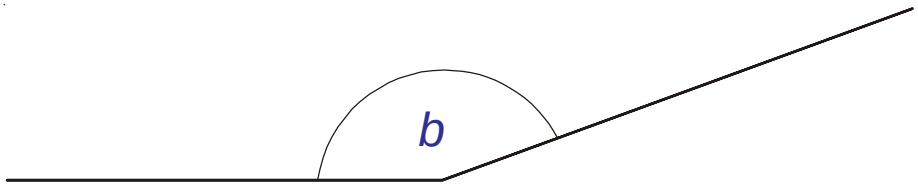
d) Draw a quadrilateral which has one right angle, one acute angle and two obtuse angles.

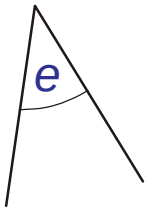
e) Draw a quadrilateral which has two obtuse angles and two acute angles.

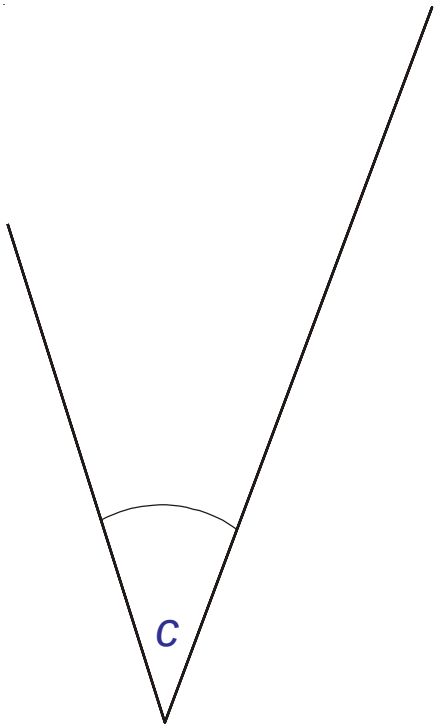
G10b Measuring Angles

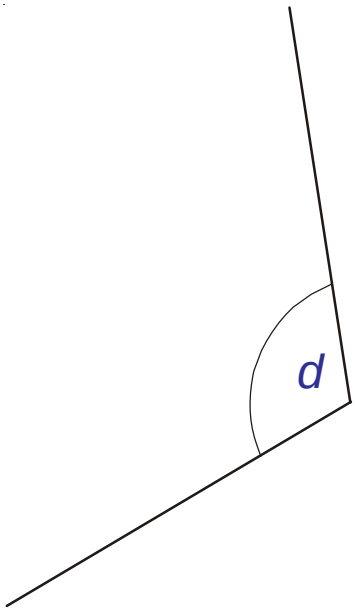
Use a protractor to measure the angles below.





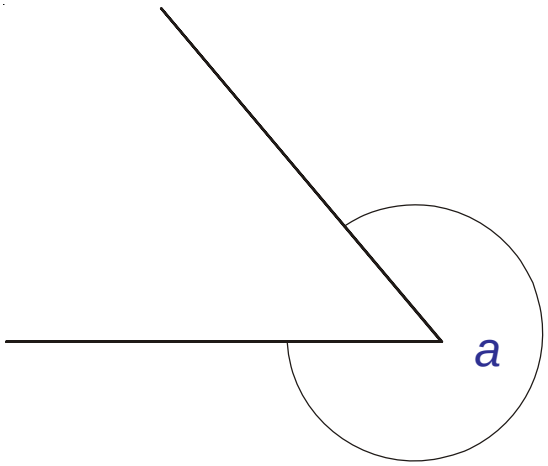


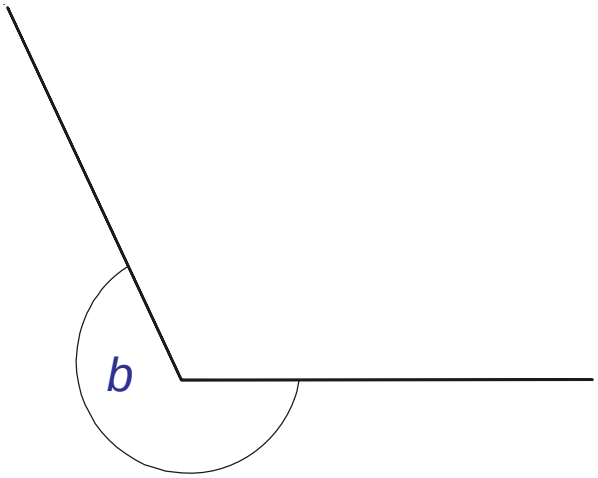


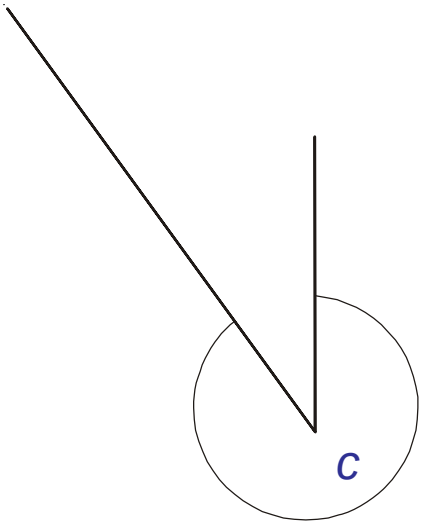


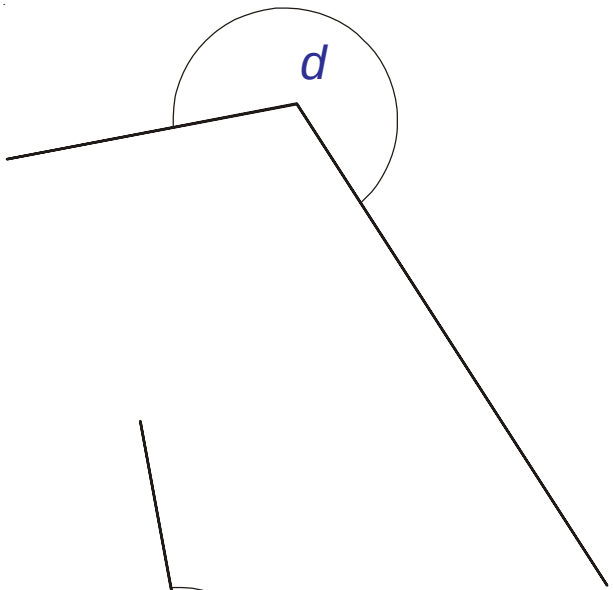
G10b Measuring Angles

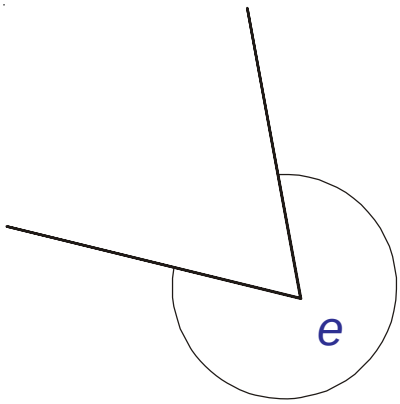
Use a protractor to measure the angles below.







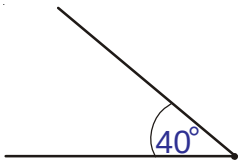




G10c Drawing Angles

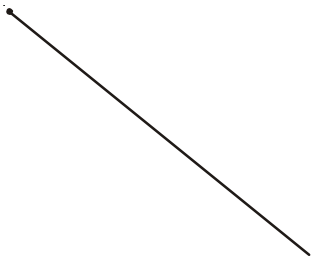
Draw the angle where you see the dot.
Here is an example:

40°



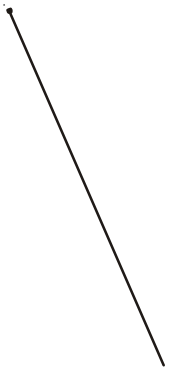
a) 70°

b) 135°



c) 28°

d) 171°



G10c Drawing Angles

Draw the angle where you see the dot.

a) 340°

b) 305°

c) 245°

d) 193°

P1 The Probability Scale

Estimate a probability (decimal) to go with these:

a) You will be on time for school on the next school day.

b) It will snow sometime this week.

c) Your teacher will smile at least once tomorrow.

d) You will have a disagreement with one of your friends.

e) England will win the World Cup in 2018.

f) England or France will win the World Cup in 2018.

S3

Frequency Tables
Ungrouped Data

Blue Green Red Yellow

1) 30 students were asked which of the four colours they liked best.
The results are listed below:

Red Green Blue Red Yellow Red Green Red
Green Yellow Red Blue Blue Red Green Blue
Red Green Green Yellow Blue Red Blue
Green Red Red Red Blue Green Green

Record these results in a tally chart.

2) Peter asked all the pupils in his class how many children there were (including themselves) in each of their families.

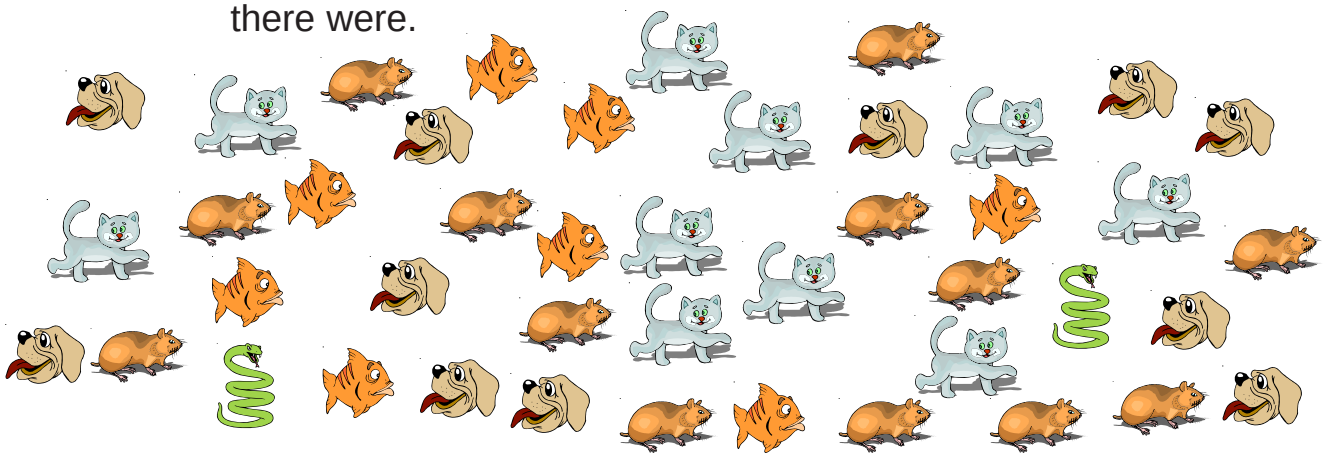
These are the results:

1, 3, 2, 2, 2, 1, 3, 2, 3, 4, 2, 1, 1, 4, 2, 6, 3, 2,
2, 1, 4, 2, 3, 3, 2, 1, 2, 5, 4, 2, 1

Show these results in a tally chart.

3) A teacher asked the pupils in her class to put stickers on the board to show which pets they had. The stickers were of dogs, cats, hamsters, goldfish and snakes.

Draw a tally chart to show how many of each pet there were.



S3

Frequency Tables
Ungrouped Data

This is the first paragraph of a book.

However, it is written in code where each letter has been replaced by a different letter.

Can you decode the paragraph?

There is a little bit of help at the bottom of the page.

Imjz zsmop mck dj m wmo-kww gmjh qbsos gdush mj kcos kw brcs loklkoqdkjp.

Bdp wmukrodqs kttrlmqdkj vmp qk tmlqros lkko lsmpmjqp mjh imfs qbsi vkof wko woss kj bdp gmjh. Bs vmpj'q usoz jdts.

Qbs jmis kw qbs kcos vmp Gmjts.

Some help

When you decode the paragraph you will find that:
'e' is the most common letter.
'a' is the second most common followed by
'o' third most common, then
'n' and 'r'
then 't'
then 's'.

S4 Frequency Tables Grouped Data

1) Here are the Maths test marks for two mixed ability Year 7 classes.

43	16	68	49	31	24	83	61	55	40	72	44	45	23	48	33	20
81	63	58	41	50	59	46	35	24	13	66	99	53	47	66	48	51
33	35	40	64	50	31	37	42	35	54	97	24	33	48	53	42	

Complete the frequency table to show all the results.

Mark	Tally	Frequency
20 and under		
21 - 30		
31 - 40		
41 - 50		
51 - 60		
61 - 70		
over 70		

2) A group of students measured their hand span (s) in in centimetres. Here are their results:

14.7	20.0	16.7	21.6	18.2	17.9	18.1
19.0	19.9	16.0	14.4	19.1	21.8	16.4
17.9	15.9	18.0	19.1	16.5	21.1	18.9

Complete the frequency table to show all the results.

Class interval	Tally	Frequency
$14 \leqslant s < 16$		
$16 \leqslant s < 18$		
$18 \leqslant s < 20$		
$20 \leqslant s < 22$		

S4 Frequency Tables Grouped Data

Sally, the organiser of a slimming club, keeps data on how much weight (w), in kg, her 60 members have lost over the previous twelve months.

She organises the data in a two-way table.

	Men	Women	Total
$0 \leqslant w < 5$	2		6
$5 \leqslant w < 10$			14
$10 \leqslant w < 15$	7		
$15 \leqslant w < 20$	2		10
$20 \leqslant w < 25$		11	14
Total	18		

a) Complete the two-way table.

b) How many members of the club were women?

c) How many women lost between 5 and 10 kg?

d) How many men lost less than 20 kg?

e) How many men lost 5 kg or more?

f) How many men and women lost 15 kg or more?

N28a

Long Multiplication
Integers

1) $17 \times 32 = \_\_\_\_$

2) $24 \times 62 = \_\_\_\_$

3) $13 \times 156 = \_\_\_\_$

4) $528 \times 16 = \_\_\_\_$

5) $34 \times 466 = \_\_\_\_$

N28b Long Multiplication Decimals

1) $1.5 \times 22 =$ _____

2) $7.6 \times 2.1 =$ _____

3) $4.5 \times 9.99 =$ _____

4) $19.7 \times 6.3 =$ _____

5) $0.35 \times 0.12 =$ _____

N28b Long Multiplication Decimals

1) Work out what the ✱ must be.

a)

	1	✱	5
		✱	2
×			
	✱	7	0
1	3	5	0
✱	✱	✱	0

b)

×	✱✱	3
80	4800	✱✱✱
✱	120	6

answer: ✱✱✱✱

c)

	4	✱	
	✱	7	
×			
3	✱	3	
✱	9	0	
✱	✱	3	

d)

×	✱0	✱
✱✱✱	✱✱✱✱	✱✱✱
40	✱✱00	✱✱✱
✱	450	25

answer: 13775

2) A school organises a trip to a museum.

They set off in 13 minibuses, each minibus containing 24 pupils who will each pay to go into the museum.

Entrance to the museum costs £1.20 per person.

a) How many people made the trip?

b) What was the total cost?

N29a

Long Division
Integers

1) 288 ÷ 12 = _____

2) 285 ÷ 15 = _____

3) 425 ÷ 25 = _____

4) 784 ÷ 56 = _____

5) 874 ÷ 38 = _____

N29b Long Division Decimals

1) $79.2 \div 22 = \_\_\_\_$

2) $5.89 \div 19 = \_\_\_\_$

3) $9.87 \div 47 = \_\_\_\_$

4) $330.2 \div 13 = \_\_\_\_$

5) $42.624 \div 16 = \_\_\_\_$

N29b Long Division Decimals

1) a) If 48 luxurious pens cost £768,
how much would one of them cost?

b) If 25 tee shirts cost £77.50,
how much would one of them cost?

c) If 53 mobile phones cost £2119.47,
how much would one of them cost?

2) Cans of juice cost 24p each.

Wendy has £8.65 to spend.

a) What is the maximum number of cans Wendy can buy?

b) How much change does she get?

3) Find the missing digits.

a)
$$14\overline{)\square 04}\quad 3\square$$

b)
$$\square 2\overline{)2\square 2}\quad 2\square$$

N30a/b Prime Numbers Introduction and Factorisation

1) Write down the first 9 prime numbers.

2) Write down the first prime number that comes after 62.

3) Split up the following numbers into the product of their prime factors.

a) 12

b) 45

c) 72

d) 120

e) 550

f) 1296

4) Find the Highest Common Factor (HCF) of the following numbers.

a) 4 and 6

b) 8 and 16

c) 36 and 48

d) 300 and 525

e) 374 and 918

f) 45, 90 and 105

N31a/b

Highest Common Factor
Lowest Common Multiple

1) Find the Highest Common Factor (HCF) of the following numbers.

a) 4 and 6

b) 8 and 16

c) 36 and 48

d) 300 and 525

e) 374 and 918

f) 45, 90 and 105

2) Find the Lowest Common Multiple (LCM) of the following numbers.

a) 8 and 12

b) 30 and 45

c) 15 and 18

d) 4, 6 and 8

e) 24 and 84

f) 72 and 96

3) The bells at Kings School ring every 6 minutes.

At Queens School the bells ring every 5 minutes.

At Princess School the bells ring every 9 minutes.

All three bells ring together at 8.30 am.

When is the next time the bells of the three schools will ring together?

N32 Decimals, Fractions and Percentages

1) Complete the tables.

a)

Fraction	Decimal	Percentage
		50%
	0.25	
$\frac{1}{10}$		
$\frac{1}{3}$		
	0.7	
		40%

b)

Fraction	Decimal	Percentage
$\frac{68}{100}$		
		35%
	0.6	
	$0.\dot{6}$	
		5%
$\frac{13}{50}$		

2) Put these fractions, decimals and percentages in order, smallest to largest.

a) $\frac{1}{2}$, 49%, $\frac{3}{5}$, 0.55

b) 27%, 0.2, $\frac{1}{4}$, $\frac{3}{10}$

c) $\frac{9}{10}$, 95%, 0.99, $\frac{97}{100}$

d) $\frac{1}{3}$, 0.6, $\frac{2}{3}$, 30%

e) 0.125, 10%, $\frac{11}{100}$, 0.09

3) Chris says that $\frac{3}{4}$ is halfway between 0.5 and 100%.

Is Chris correct? You must explain your answer.

4) Emily says that 0.2 is halfway between 10% and $\frac{3}{5}$.

Is Emily correct? You must explain your answer.

N33 Fraction of an Amount

1) Find the following:

a) $\frac{1}{3}$ of 24

b) $\frac{2}{3}$ of 24

c) $\frac{1}{5}$ of 30

d) $\frac{3}{5}$ of 30

e) $\frac{1}{8}$ of 40

f) $\frac{5}{8}$ of 40

2) Work out:

a) $\frac{7}{10}$ of £30

b) $\frac{3}{7}$ of £84

c) $\frac{4}{5}$ of £1.50

d) $\frac{11}{20}$ of £19

e) $\frac{2}{9}$ of £10.98

f) $\frac{8}{13}$ of £31.85

3) Julie has £4.50 pocket money every week.
If she spends $\frac{2}{5}$ of it on a magazine and $\frac{1}{3}$ of it on a dance lesson, how much of the pocket money does she have left?

4) Paul has £7.80 pocket money each week.
He always saves $\frac{1}{3}$ of it.
With the remaining money he spends $\frac{5}{8}$ on comics and the rest on sweets.

(i) How much does he save?

(ii) How much is spent on comics?

(iii) How much does he spend on sweets?

N33 Fraction of an Amount

1) a) Find $\frac{1}{2}$ of $\left(\frac{2}{3} \text{ of } 60\right)$

b) Find $\frac{3}{4}$ of $\left(\frac{1}{2} \text{ of } 80\right)$

c) Find $\frac{1}{2}$ of $\frac{4}{9}$ of $\frac{3}{4}$ of 42

2) a) If $\frac{3}{4}$ of a number is 60, what is the number?

b) If $\frac{3}{7}$ of a number is 21, what is the number?

c) If $\frac{4}{9}$ of a number is 12.3, what is the number?

3) If $\frac{1}{2}$ of $\frac{1}{5}$ of a number is 6, what is the number?

4) If $\frac{1}{2}$ of $\frac{1}{3}$ of $\frac{1}{4}$ of $\frac{1}{5}$ of a number is 2.5, what is the number?

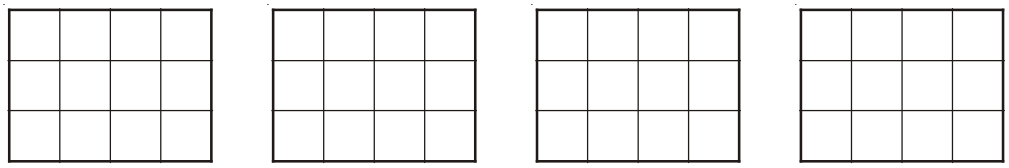
5) If $\frac{3}{5}$ of $\frac{1}{2}$ of $\frac{2}{3}$ of a number is 3.8, what is the number?

N34 Ordering Fractions

1) Put the following fractions in order of size starting with the smallest.

You can use the grids to help if you wish.

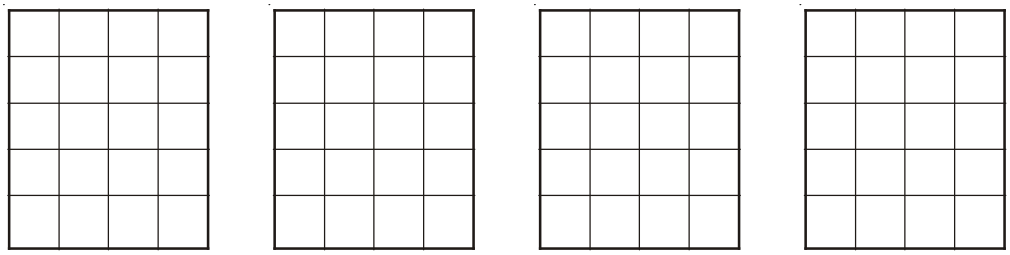
$\frac{3}{4}$ $\frac{5}{6}$ $\frac{2}{3}$ $\frac{7}{12}$



2) Put the following fractions in order of size starting with the smallest.

You can use the grids to help if you wish.

$\frac{13}{20}$ $\frac{3}{5}$ $\frac{3}{4}$ $\frac{7}{10}$



3) Put the following fractions in order of size starting with the smallest.

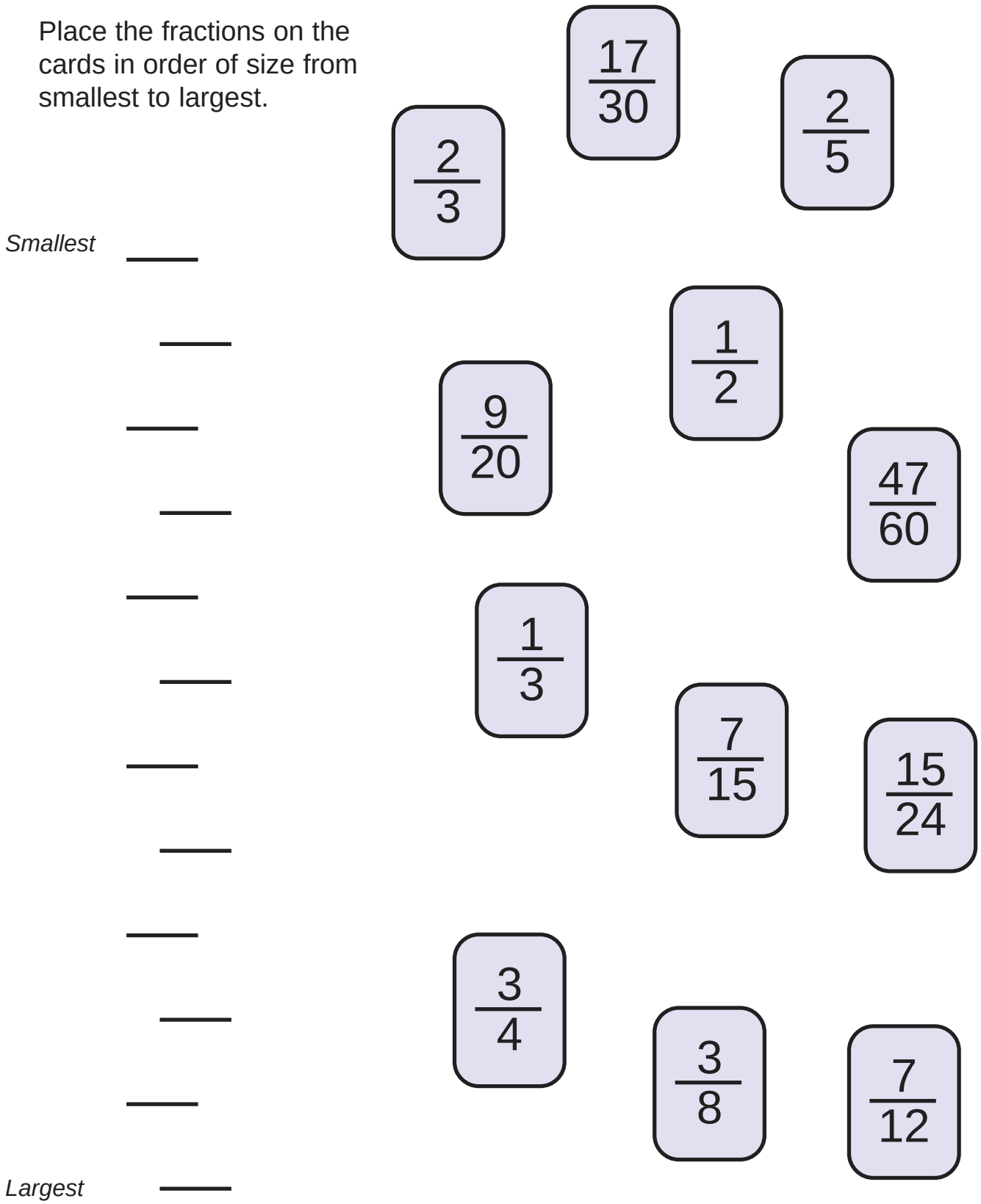
$\frac{7}{12}$ $\frac{1}{2}$ $\frac{5}{8}$ $\frac{13}{24}$

4) Put the following fractions in order of size starting with the smallest.

$\frac{2}{5}$ $\frac{3}{10}$ $\frac{1}{3}$ $\frac{1}{6}$

N34 Ordering Fractions

Place the fractions on the cards in order of size from smallest to largest.



N35 Improper Fractions Mixed Numbers

1) Convert the following improper fractions to mixed numbers.

a) $\frac{5}{4}$

b) $\frac{8}{3}$

c) $\frac{12}{7}$

d) $\frac{20}{9}$

e) $\frac{16}{5}$

f) $\frac{25}{3}$

g) $\frac{30}{7}$

h) $\frac{75}{8}$

i) $\frac{47}{12}$

j) $\frac{100}{9}$

2) Convert the following mixed numbers to improper fractions.

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

b) $2\frac{1}{4}$

c) $5\frac{2}{3}$

d) $3\frac{3}{5}$

e) $11\frac{2}{7}$

f) $10\frac{1}{9}$

g) $7\frac{5}{8}$

h) $9\frac{4}{5}$

i) $6\frac{3}{11}$

j) $12\frac{3}{4}$

3) Put these numbers in order, lowest to highest.

a) 3.5, $3\frac{1}{5}$, $\frac{11}{3}$

b) $7\frac{1}{4}$, 7.14, $\frac{34}{5}$

c) $1\frac{1}{10}$, 98%, $\frac{5}{4}$, 1

N36 Fractions Adding and Subtracting

1) Work out the following, simplifying your answers where possible.

a) $\frac{2}{7} + \frac{3}{7} = \frac{\square}{7}$

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

c) $\frac{7}{9} - \frac{2}{9} = \frac{\square}{9}$

d) $\frac{5}{10} - \frac{1}{10} =$

e) $\frac{1}{6} + \frac{2}{3} = \frac{\square}{18} + \frac{\square}{18} =$

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

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

h) $\frac{14}{15} - \frac{3}{5} = \frac{\square}{15} - \frac{\square}{15} =$

2) Work out the following, simplifying your answers where possible.

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

b) $\frac{9}{11} - \frac{5}{11} =$

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

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

e) $\frac{1}{2} + \frac{2}{5} =$

f) $\frac{5}{6} - \frac{1}{4} =$

g) $\frac{5}{12} + \frac{1}{6} =$

h) $\frac{4}{5} - \frac{1}{10} =$

i) $\frac{3}{8} + \frac{1}{2} =$

j) $\frac{8}{9} - \frac{5}{6} =$

3) Write the missing numbers in each of these fraction sums.

a) $\frac{1}{3} + \frac{\square}{6} = 1$

b) $\frac{3}{7} + \frac{12}{\square} = 1$

c) $\frac{8}{5} - \frac{\square}{15} = 1$

d) $\frac{15}{\square} - \frac{1}{4} = 1$

N37a/b Fractions - Multiplying and Dividing an Integer

1) Work out the following, giving your answers in their simplest forms

a) $3 \times \frac{1}{4}$

b) $7 \times \frac{1}{7}$

c) $2 \times \frac{4}{5}$

d) $9 \times \frac{1}{3}$

e) $4 \times \frac{4}{9}$

f) $10 \times \frac{3}{8}$

g) $\frac{8}{9} \times 6$

h) $\frac{2}{15} \times 3$

2) Work out the following, giving your answers in their simplest forms

a) $\frac{1}{2}$ of £40

b) $\frac{1}{5}$ of 20 km

c) $\frac{1}{4}$ of 120 kg

d) $\frac{1}{9}$ of £99

e) $\frac{2}{5}$ of 30 cm

f) $\frac{7}{8}$ of £16

g) $\frac{4}{7}$ of 7000 g

h) $\frac{3}{4}$ of £500

3) Work out the following, giving your answers in their simplest forms

a) $3 \div \frac{1}{4}$

b) $7 \div \frac{1}{2}$

c) $12 \div \frac{1}{3}$

d) $9 \div \frac{1}{5}$

e) $10 \div \frac{2}{3}$

f) $8 \div \frac{4}{5}$

g) $3 \div \frac{5}{7}$

h) $15 \div \frac{2}{3}$

4) An industrial machine takes $\frac{3}{4}$ of an hour to produce a very special tool. How long would it take the machine to produce 12 of the tools?

5) A road is 20 km long. Road signs are to be installed every $\frac{2}{3}$ of a kilometre. How many signs will be needed?

A2 Algebraic Vocabulary

1) State whether each of the following is an expression, an equation or an inequality:

   a) $2x + 4 = 9$

   b) $3x + 4y$

   c) $5a - 1 < 10$

   d) $6b + 7d = 20$

   e) $9 < 5x$

2) How many terms does each of the following have?

   a) $3a + 4$

   b) $2x + 3y - 4z$

   c) $5 + 2n + 3m - 4p$

3) a) Write down any two numbers that are factors of 24

   b) Write down all the factors of 12.

   c) Is 3 a factor of $3x + 9$?

   Explain how you know.

A3 Formulae Expressed in Words

1) A vintage car hire firm charges £70 for the first day's hire followed by £55 per day for all other days.

   a) How much would it cost to hire a car for 2 days?

   b) How much would it cost to hire a car for 9 days?

   c) When Sue hires a car it costs her £345.
   How many days did she hire the car for?

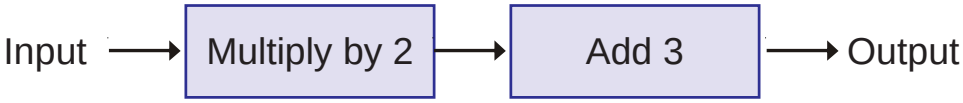
2) It costs 4p per copy on the school photocopier.

   a) How much would it cost to make 15 single-sided copies?

   b) Jane has to make 6 copies of a document which is double-sided (writing on both sides).
   How much will it cost?

   c) Ted copies a single-sided document but forgets how many copies he has made.
   Rather than counting them he simply looks at the bill and works it out from there.
   The bill was for £2.20.
   How many copies had he made?

Single-sided copies 4p each



3) a) If Simon puts 7 into the number machine, what number comes out?

   b) If 100 goes in, what comes out?

   c) If 5½ goes in, what comes out?

   d) If 2.25 goes in, what comes out?

   e) If 25 comes out, what number was put in?

   f) If 8 comes out, what number was put in?

   g) If *x* goes in, what comes out?

A3 Formulae Expressed in Words

1) *Choose any number*.
Add three to it.
Multiply your result by two.
Add six to it.
Halve your answer.
Subtract your original number.

You should be left with six.
Try to find out why you are always left with six.

---

2)

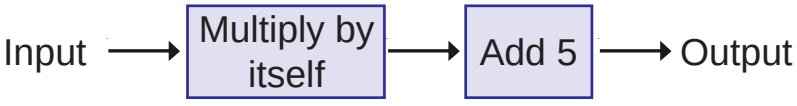
Input	Output
1	__
4	__
10	__
2.5	__
-3	__
__	30
__	48
__	-18
x	$4x - 2$

3)

Input	Output
1	__
4	__
10	__
2.5	__
-3	__
__	30
__	48
__	-18
x	$4(x - 2)$

---

4) Copy the table on the right.
Use this function machine to complete the table.



Input	Output
3	__
10	__
-4	__
__ or __	54
x	__

A4 Algebraic Notation

What expression do I have if I think of a number, double it and then add three?

Answer: $2x + 3$

Say what the expression $4x + 17$ means in words.

Answer: Take a number, multiply it by four and then add seventeen.

1) Write down the expression you will have if you think of a number (let x be the number) and then:

   a) add three to it

   b) double it

   c) multiply it by three and then subtract four

   d) multiply it by itself

   e) divide it by two

   f) divide it by two and then add one

   g) add three to it and multiply the result by two

   h) multiply it by five, add four, divide the result by two

2) Say what the following expressions mean in words.

   a) $x + 6$

   b) $x - 7$

   c) $8x$

   d) $4x + 2$

   e) $\frac{x}{5}$

   f) $6(x + 7)$

   g) $4(3x - 1)$

---

3) If $s = 2v$, work out the value of s when $v = 7$

4) If $y = 3t + 4$, work out the value of y when $t = 5$

5) If $g = 2t - 1$, work out the value of g when $t = 9$

6) If $f = 2(t + 8)$ and $t = 3$, find the value of f

7) If $d = 3(2e - 3)$ and $e = 5$, find the value of d

8) If $c = 4$ and $d = 3$, find the value of:

   a) $2c$

   b) $2c - d$

   c) cd

   d) $5c + 2d$

   e) $10cd$

   f) $2(c + d)$

   g) $5(3c - 2d)$

A4 Algebraic Notation

The body mass index (BMI) is a measure used to show if an adult is at a healthy weight. It doesn't apply to children, only adults.

Here is a formula for calculating BMI

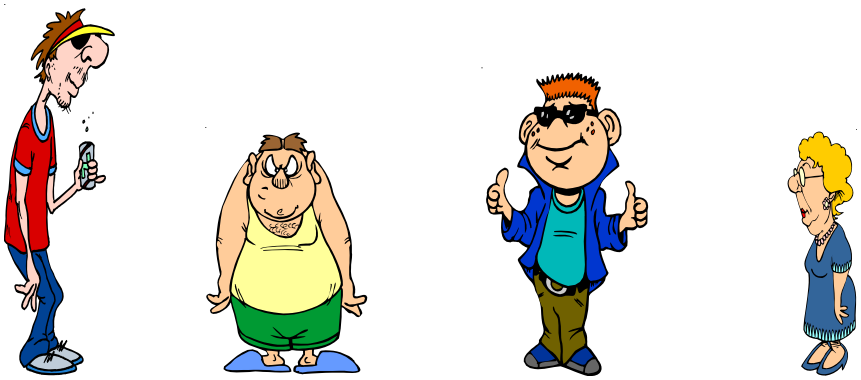
BMI = (weight in kg) ÷ (height in m) ÷ (height in m)

A person with BMI between 18.5 and 25 is at a healthy weight.

A person with BMI less than 18.5 is underweight.

A person with BMI between 25 and 30 is overweight.

A person with BMI over 30 is obese.



Here are the heights and weights of the four people above.
They are in no particular order.

Height (m)	1.74	1.82	1.62	1.62
Weight (kg)	70	57	55	74
BMI				

a) Work out the BMI for each height and weight and put them in the table.
Give your answers to the nearest whole number.

b) Match each height, weight and BMI with the correct person.

c) For each person, decide whether he/she is underweight, healthy, overweight or obese - write the answer next to each person.

d) A woman is 1.65 m tall and weighs 45.6 kg.
She worries that she is overweight.
Is she right?

A5 Horizontal and Vertical Lines

1) Draw the following lines on the axes to the right:

a) $x = 3$

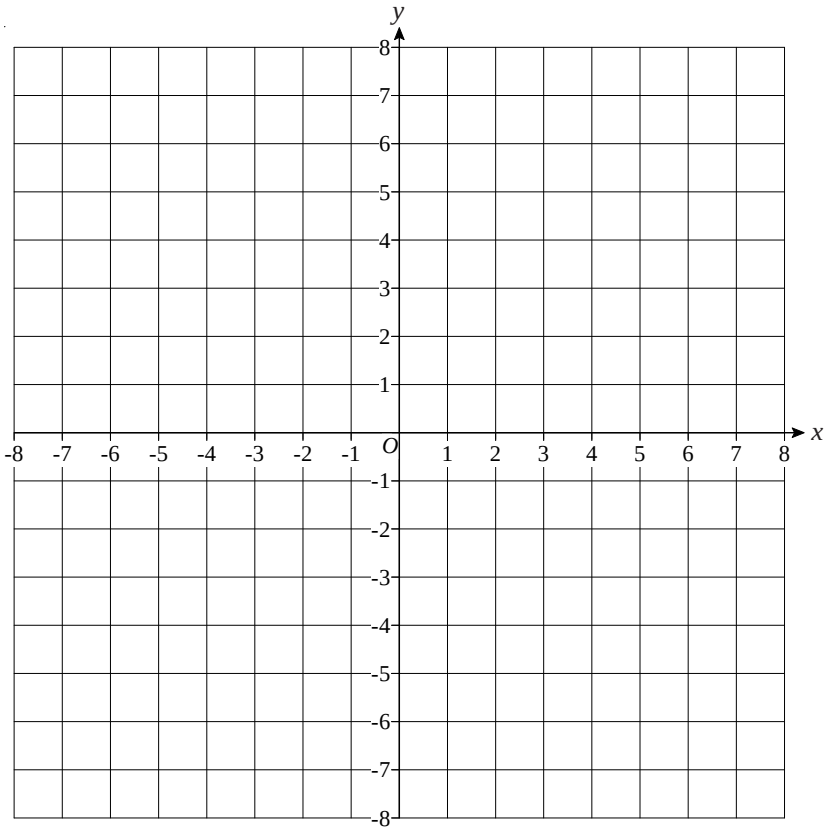
b) $x = -4$

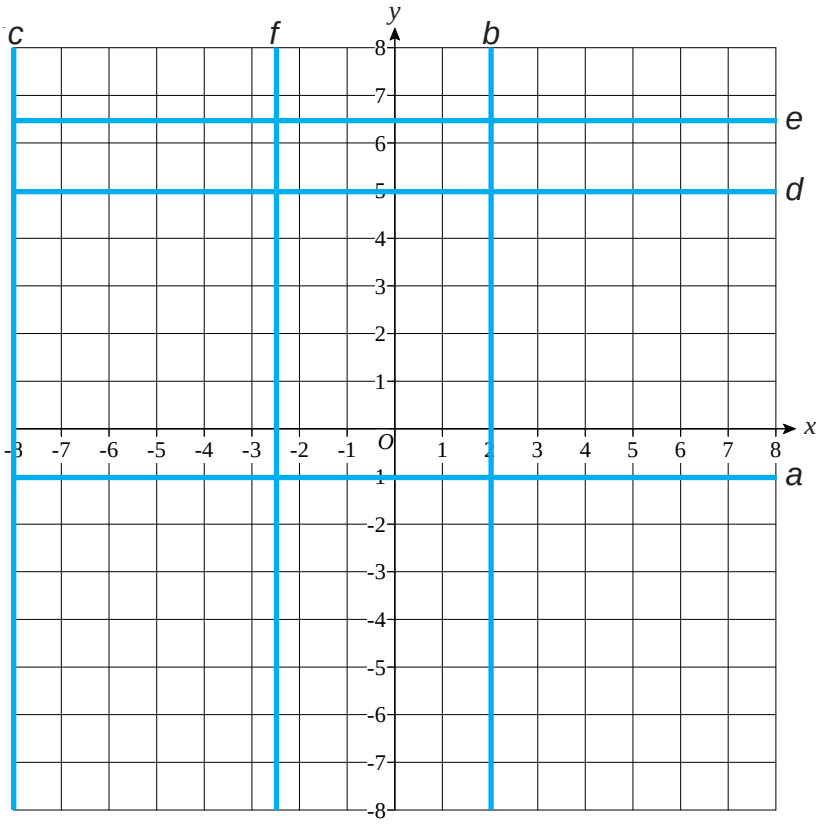
c) $y = 1$

d) $x = 7.5$

e) $y = -3$

f) $y = 4.5$





2) Name all the lines drawn on the axes on the left.

Line *a* is:_____

Line *b* is: _____

Line *c* is: _____

Line *d* is: _____

Line *e* is: _____

Line *f* is: _____

A6 Collecting Like Terms

1) Simplify these expressions

a) $3a + 4a =$

b) $b + 4b =$

c) $5x - x =$

d) $6d + 3d - 2d =$

e) $2k + k + k - 3k =$

f) $3r - 2r + 4r =$

g) $5t - 3t + t + 2t =$

h) $7p - p + 2p - 5p =$

i) $-4y + 2y - y + 4y =$

j) $-2c + c - 3c - c =$

2) Simplify these expressions

a) $a + b + a + b =$

b) $3a + 2a + 4b + b =$

c) $7x + 2y + x + 3y =$

d) $5r + 6p - 2r - 3p =$

e) $4c + 8d - 3c + d =$

f) $6x - 4y + 7y - 2x =$

g) $2k - 3l - k + 10l =$

h) $3m + 5n + 7m - 7n =$

i) $v - 4w - 5v - 2w =$

j) $-3x - y - 3y - x =$

3) Simplify these expressions

a) $7xy - 2xy =$

b) $5cd + 3dc =$

c) $x^2 + 4x^2 + 2x^2 =$

d) $9y^3 + y - 2y^3 =$

e) $3ab + 7ab - 2a =$

f) $6m + 2pr - m + 3rp =$

g) $10a^2d + 2y - 3da^2 + y^2 =$

h) $bz^2 + 4t^3 - 3t^3 - 5zb^2 =$

i) $2r^2b + 5r^2 - r + 6br^2 =$

j) $8x^3y + 2w - 5w - 3yx^3 =$

A7a Algebraic Simplification Multiplication

1) Simplify the following

a) $6 \times x$

b) $2 \times x \times y$

c) $6 \times x \times 3 \times y$

d) $s \times t \times u$

e) $7 \times s \times 2 \times t \times u$

2) Simplify the following

a) $x \times x \times x \times x$

b) $t \times t \times t \times t \times t \times t$

c) $g \times g$

d) $x \times x \times x \times y \times y \times y \times y$

e) $x \times y \times x \times y \times y$

3) Simplify the following

a) $x \times x^2$

b) $y^3 \times y^4$

c) $x^2 \times x^3 \times x$

d) $g \times g \times g^2 \times g^4$

e) $x^2 \times x^3 \times x^4 \times x^5$

4) Simplify the following

a) $3x^2 \times 2x^3$

b) $5x \times 4x^2$

c) $6y^3 \times 2y^4$

d) $9x^2 \times x^3$

e) $4x^3 \times 2x \times 3x^2$

5) Simplify the following

a) $3x^2y^3 \times 2x^3y^4$

b) $2xy^4 \times 3x^2y$

c) $5x^3y^4 \times 2x^2y^2$

d) $2x^2y \times x^4y^2$

e) $3x^3y \times 2xy^2 \times 3x^2y^2$

A7b Algebraic Simplification Division

1) Simplify the following

a) $x^8 \div x^2$

b) $9y^6 \div 3y^2$

c) $14y^3 \div 2y^2$

d) $20x^5 \div 4x$

e) $16x^8 \div 8x^2$

2) Simplify the following

a) $\frac{12x^6}{3x^2}$

b) $\frac{20x^3}{2x}$

c) $\frac{5x^4}{x^2}$

d) $\frac{6x^5}{3x^3}$

e) $\frac{300x^9}{10x^2}$

3) Simplify the following

a) $\frac{12x^3y}{4x}$

b) $\frac{15x^4y^3}{3xy}$

c) $\frac{20x^3y^5}{4x^2y^3}$

d) $\frac{14x^2y^2}{7xy}$

e) $\frac{30x^2y^3z^6}{3xy^2z^4}$

4) Find the value of

a) 4^0

b) 6^0

c) 12^0

d) z^0

e) x^0

A8 Expanding Brackets

1) Expand

a) $2(x + 3)$

b) $2(x – 4)$

c) $5(2x + 1)$

d) $7(3x – 1)$

e) $4(2a + 7)$

2) Expand

a) $2x(3x + 1)$

b) $3x(4x – 2)$

c) $2x(x + 1)$

d) $3x(2x – y)$

e) $5x(3x + 2y)$

3) Expand and simplify

a) $2(x + 3) + 4(x + 1)$

b) $3(2x + 1) + 2(5x + 2)$

c) $4(x + 1) + 3(3x + 4)$

d) $6(2x + 3) + 5(x + 2)$

e) $4(3x + 2) + 5(2x + 1)$

4) Expand and simplify

a) $2(5x + 3) + 3(x – 1)$

b) $3(4x + 5) + 2(3x – 4)$

c) $5(2x – 1) + 3(2x + 5)$

d) $2(3x – 4) + 3(x + 2)$

e) $3(2x – 1) + 4(3x – 2)$

5) Expand and simplify

a) $3(x + 2) – 2(x + 3)$

b) $4(2x + 3) – 3(2x + 1)$

c) $5(3x – 2) – 2(x – 2)$

d) $2(5x – 1) – 4(2x – 3)$

e) $3(2x + 7) – 2(3x + 2)$

A9 Factorisation

1) Factorise the following

a) $6x - 2$

b) $8x + 14$

c) $6x + 9$

d) $10x - 5$

e) $12x + 18$

2) Factorise the following

a) $x^2 + x$

b) $t^2 - t$

c) $x^3 + x$

d) $x^5 - x^2$

e) $a^7 + a^4$

3) Factorise the following

a) $3x^2 + 6x$

b) $8x^3 - 2x$

c) $12a^2 + 4a^3$

d) $20x^4 - 6x^2$

e) $7x^3 + 8x$

4) Factorise the following

a) $6x^2y^4 + 4xy^3$

b) $4x^3y^4 + 2x^2y^2$

c) $10x^4y^3z - 5xy^5z$

d) $16a^2b^3c^4 + 3ab^2c^3$

e) $9x^2y^4z - 6xy^2z$

5) Factorise the following

a) $10x + 4$

b) $x^4 - x^2$

c) $9x^5 - 12x^2$

d) $12x^2y^3 + 4xy^2$

e) $24x^3yz^4 - 10xz^2$

A10 Substitution

1) Using $a = 3$, work out

a) $a + 5$ d) $2a + 1$

b) $7 - a$ e) $13 - \frac{a}{3}$

c) $6a$ f) $a^2 + 2a - 20$

2) Using $x = 5$ and $y = 2$, work out

a) $x - y$ d) $5y - 5x$

b) $y - x$ e) $x^2 + 3y$

c) $3x + 2y$ f) $\frac{4x}{y} - xy$

3) Using $a = 3$, $b = 1$ and $c = -2$, work out

a) $a + b + c$ d) $ab - c$

b) $2b + c$ e) $ac + 5b$

c) $c - a + b$ f) $c^2 - 2ab$

4) Using $x = 3$, work out

a) $x^2 - 2x$

b) $2x^2 + x + 1$

c) $x^3 - 2x^2 - 5$

5) If $\pi = 3.142$ and $r = 9$, work out

a) $2\pi r$

b) πr^2

A11a Sequences Term-to-Term Rule

1) Write the first five terms of each sequence

a) Start at 1 and add 5

b) Start at 30 and subtract 4

c) Start at 11 and add 9

d) Start at 8 and subtract 4

e) Start at -10 and add 6

f) Start at 4 and subtract 3

2) For each sequence, describe the rule and find the next two terms

a) 5, 7, 9, 11, ___, ___

b) 11, 16, 21, 26, ____, ____

c) 22, 19, 16, 13, ____, ____

d) -1, 2, 5, 8, ___, ___

e) 6, 2, -2, -6, ____, ____

f) -42, -35, -28, -21, ____, ____

3) Here is a pattern made up of sticks

a) Write the pattern as a number sequence.

b) Describe the rule.

c) Find the next five terms of the sequence.

A11b Sequences
Position-to-Term Rule

For each sequence, find the first 5 terms and the 10th term.

a) $3n - 1$

b) $n + 2$

c) $5n + 2$

d) $4n - 7$

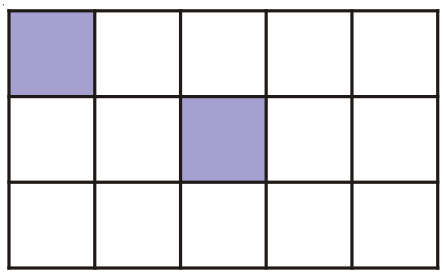
e) $10n + 9$

R1a

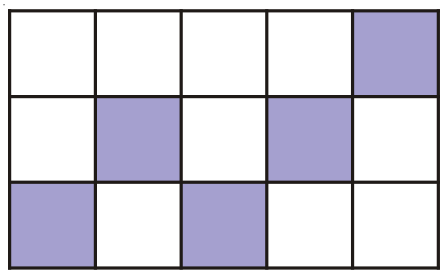
Introduction to Ratio
Real-Life Contexts

1) For each of the three grids below, write down the ratio of shaded squares to unshaded squares.
Simplify the ratios if possible.

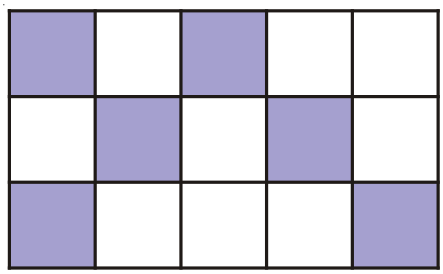
a)



b)



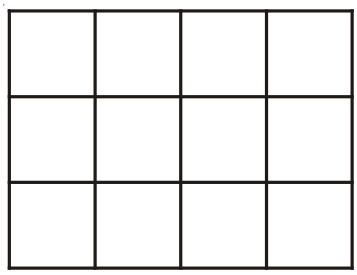
c)



2) Shade in squares for each grid to give the correct ratios.

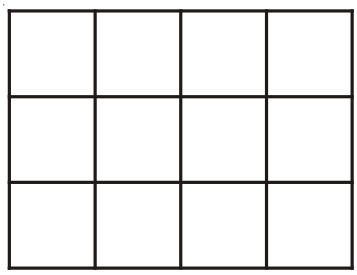
a) Shaded : Unshaded

5 : 7



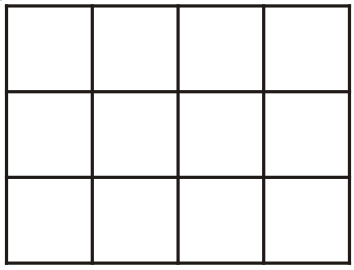
b) Shaded : Unshaded

1 : 2



c) Shaded : Unshaded

5 : 1



3) The instructions on a lemon squash bottle are as follows:

1 part squash to
4 parts water

a) If you put 20 ml of squash in a glass, how much water would you need?

b) If you had used 200 ml of water, how much squash should be in the drink?

c) If you want to make 500 ml of squash drink, how much squash should be used and how much water?

R1a

Introduction to Ratio
Real-Life Contexts

1) Here we have a fine example of a Vesuvian and a Dragian.

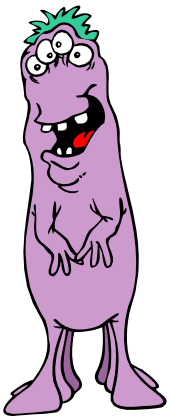
If you count carefully you can see that the ratio of teeth is 5 : 7

a) What is the ratio of feet?

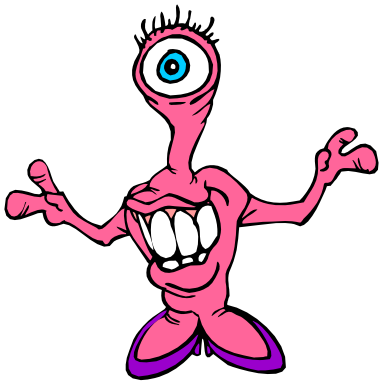
b) What is the ratio of eyes?

c) What is the ratio of fingers?

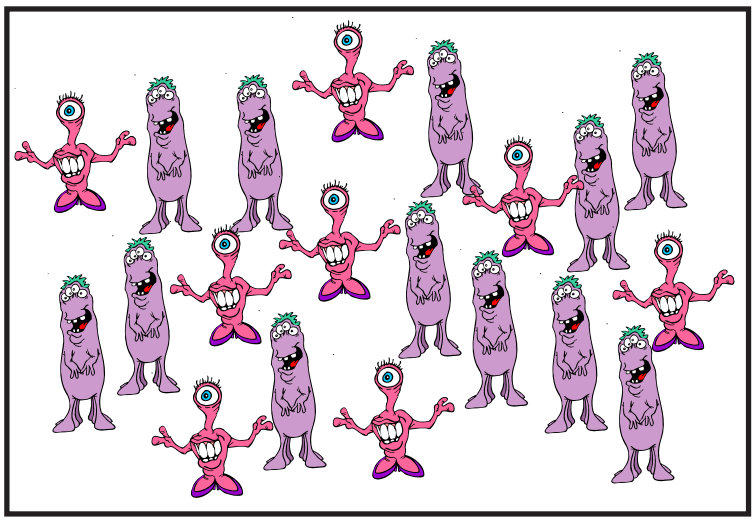
Check that you have given all ratios in the simplest form.



Vesuvian



Dragian



2) Look at this picture of Vesuvians and Dragians and work out the following:

a) The ratio of Vesuvians to Dragians.

b) The ratio of Vesuvian feet in the picture to Dragian feet in the picture.

c) The ratio of Vesuvian eyes in the picture to Dragian eyes in the picture.

3) In another picture of Vesuvians and Dragians we only know two things:

Firstly, there are more Vesuvians than Dragians.
Secondly, there are 46 teeth altogether in the picture.

Work out how many Vesuvians and Dragians there are in the picture.

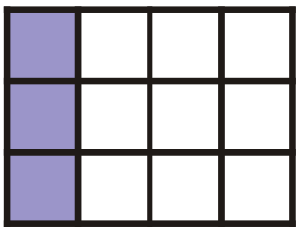
R1b

Introduction to Ratio
Shading

1) Draw ten 4 by 3 rectangles and label them a to j

Shade in the rectangles in the following ratios. →

The first answer is a



The three shaded squares could have been any three of the squares.

	Shaded	: Unshaded
a	1	3
b	1	2
c	1	5
d	5	7
e	1	1
f	1	11
g	2	4
h	0.5	2.5
i	0.2	1
j	9	15

R2 Unit Conversions

1) a) How many grams are in 3 kg?

b) How many grams are in 4.5 kg?

c) Convert 2 kg to g.

d) Convert 6000 g to kg.

e) How many kg is 1500 g?

2) a) How many millilitres are in 9 litres?

b) How many litres is 7000 ml?

c) Convert 3400 ml to L.

d) Convert 8L to ml.

e) How many ml are in 7.3 L?

3) a) How many cm are in 3 m?

b) How many mm are in 11 centimetres?

c) Convert 400 cm to m.

d) Convert 3 km to m.

e) How many mm are in 5 m?

f) Convert 9600 mm to m.

R3 Expressing Quantities as Fractions

1) There are 25 apples in a bag.
15 of them are red.
What fraction of the apples are red?
Give your answer in its simplest form.

2) Fishfingers are sold in packets that say ‘minimum 10’ on them.
Here is the number of fishfingers in each of 12 packets.

10, 11, 10, 10, 11, 10, 10, 10, 10, 11, 10, 10

What fraction of the packets have more than 10 fishfingers?
Give your answer in its simplest form.

3) 6 litres of pink paint can be made by mixing 1.5 litres of red paint with the correct amount of white paint.

a) How much white paint is needed?

b) What fraction of the pink paint was white paint?
Give your answer in its simplest form.

4) Two thirds of the students in a class have a pencil.

14 students have a pencil.

How many students are in the class?

R4 Unit Pricing

1) A bag of six apples cost £1.08

   What is the price per unit?

2) a) A pack of 40 teabags costs £1.20

      What is the price per unit?

   b) A pack of 50 teabags costs £2.00

      What is the price per unit?

   c) Which pack offers better value for money?

A calculator can be used for this question.

3) Julie wants to buy 24 yoghurts.

   The shop sells them in two pack sizes.

   There is a 12-pack at £3.90

   There is an 8-pack at £3 or you can buy two 8-packs for £4.

   a) What is the cheapest way for Julie to buy 24 yoghurts and what will the price be?

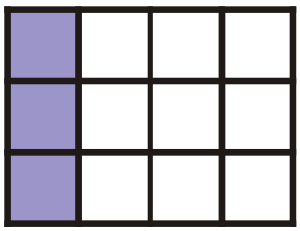
   b) What is the price per unit, to the nearest penny if Julie buys the yoghurts in the cheapest way?

R5a Ratios - Simplifying

1) Draw ten 4 by 3 rectangles and label them a to j

Shade in the rectangles in the following ratios. →

The first answer is a



The three shaded squares could have been any three of the squares.

	Shaded	: Unshaded
a	1	3
b	1	2
c	1	5
d	5	7
e	1	1
f	1	11
g	2	4
h	0.5	2.5
i	0.2	1
j	9	15

2) Write the following ratios in their simplest form:

a) 8 : 12

b) 6 : 10

c) 15 : 10

d) 16 : 4

e) 18 : 16

f) 25 : 15

g) 45 : 15

h) 18 : 27

i) 24 : 30

j) 36 : 48

3) Find the missing numbers in these ratios:

a) 1 : 4 = 2 : ☐

b) 1 : 5 = 6 : ☐

c) 2 : 7 = 8 : ☐

d) 5 : 4 = 15 : ☐

e) 2 : 3 = ☐ : 12

f) 9 : 5 = ☐ : 35

g) 3 : ☐ = 18 : 30

R5b

Ratios - Sharing

1) Share out £20 between Bill and Sue in the ratio 3 : 2.

2) Divide £60 between Jack and Jill in the ratio 7 : 3.

3) Debbie and Dave share 200 Smarties in the ratio 1 : 4. How many Smarties do they each get?

4) Alec, Tony and Sara share £720 in the ratio 1 : 2 : 3. How much do they each get?

5) If Dave and Sue share £30 in the ratio 2 : 3, how much more than Dave does Sue get?

6) Divide £12 between Mick and Sharon in the ratio 5 : 3.

---

7) Pete and Sandra work part-time in a restaurant. They share the tips in the ratio 3 : 5.
If Pete gets £30 at the end of the week, how much will Sandra get?

8) Vicky and John share some sweets in the ratio 2 : 7.
If Vicky ends up with 12 sweets, how many will John have?

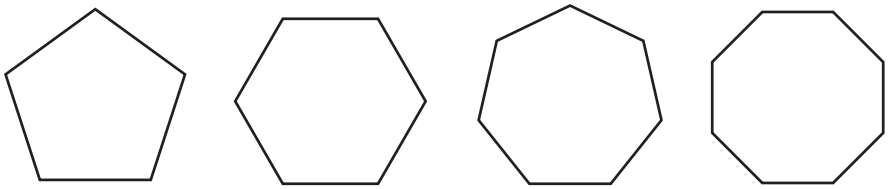
9) Len makes some concrete by mixing cement, sand and gravel in the ratio 1 : 4 : 3.
If he uses 8 bags of sand, how many bags of cement and gravel will he use?

10) An old television has a width and height in the ratio 4 : 3. If the width is 48 cm, what is the height?

R5b

Ratios - Sharing

1) Which one of these regular polygons has the number of diagonals and the number of sides in the ratio 2 : 1?



A B C D

2) Two numbers are in the ratio 7 : 3.
If you take one of the numbers away from the other one you get an answer of 24.
What are the two numbers?

3) In a class of 30 pupils the ratio of boys to girls is 2 : 3.
If 6 girls (but no boys) join the class what is the new ratio of boys to girls?

4) Sue, Ted and Ben all have their birthday on the 1st January.
In 2010, Sue, Ted and Ben have ages in the ratio 2 : 3 : 4.

a) If Ted is 15 years old, how old are Sue and Ben?

b) When Sue, Ted and Ben are all five years older, what will be the ratio of their ages? Write the answer in its simplest form.

c) In which year was the ratio of Sue, Ted and Ben's age 1 : 2 : 3?

d) How old was Ben when the ratio of the three ages was 1 : 3 : 5?

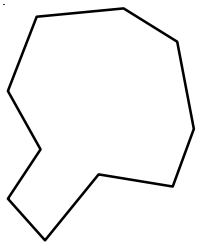
e) On what date was the ratio of Sue and Ben's age 1 : 41?

G11 Polygons

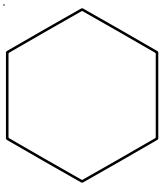
1) How many sides does a pentagon have?

2) Give the two names for a 7-sided polygon _____ and _____

3) Match the shapes to the names

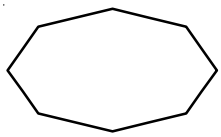


Regular hexagon

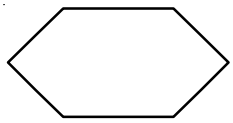


Irregular pentagon

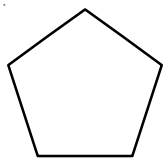
Regular pentagon



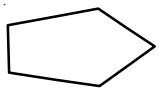
Octagon



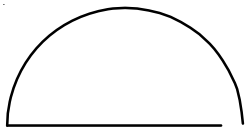
Irregular hexagon



Decagon

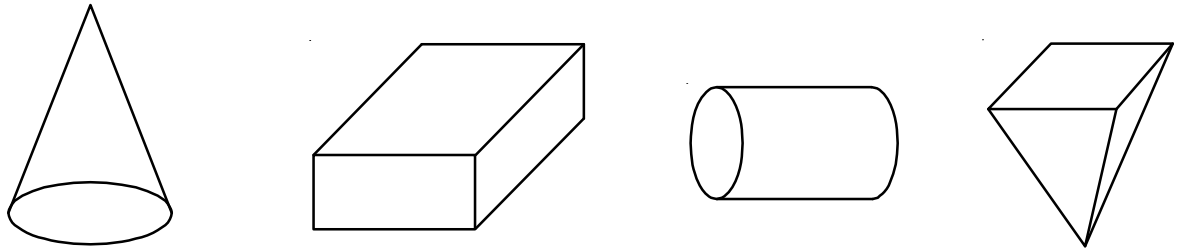


4) Give two reasons why this diagram does not show a polygon.

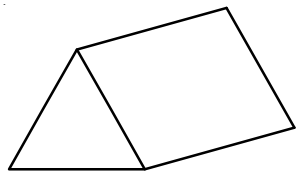


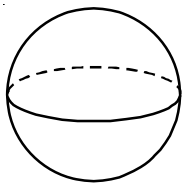
G12a 3D Shapes - Properties

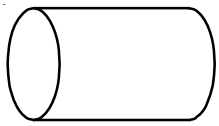
1) Which of these shapes are prisms? Tick them.

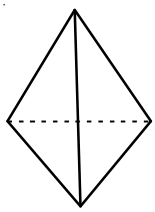


2) Write the names of these shapes.

a) 

b) 

c) 

d) 

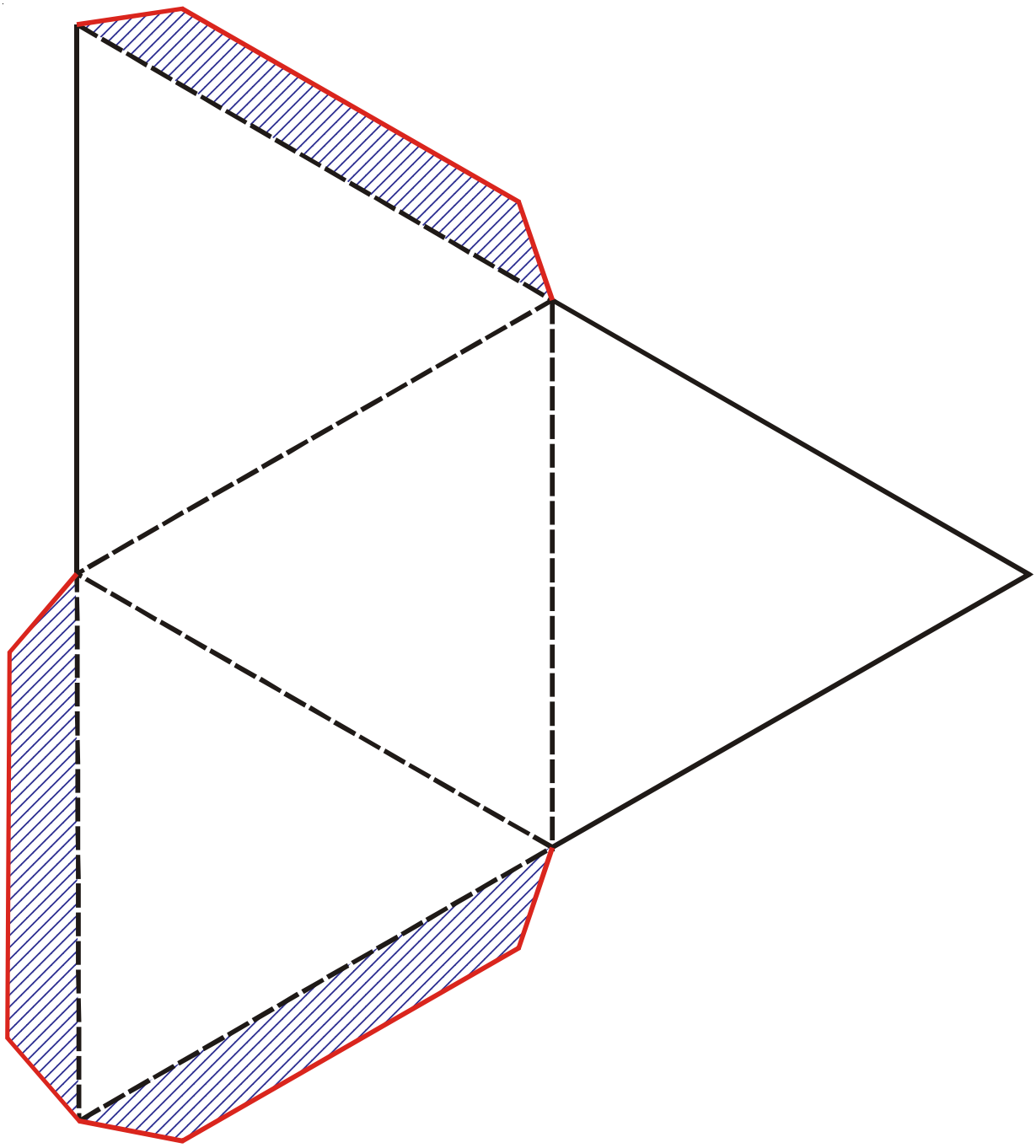
3) a) A prism has 5 faces, 9 edges and 6 vertices.
What is its name?

b) A pyramid has 4 faces, 6 edges and 4 vertices.
What shape must its base be?

G12b

3D Shapes - Models

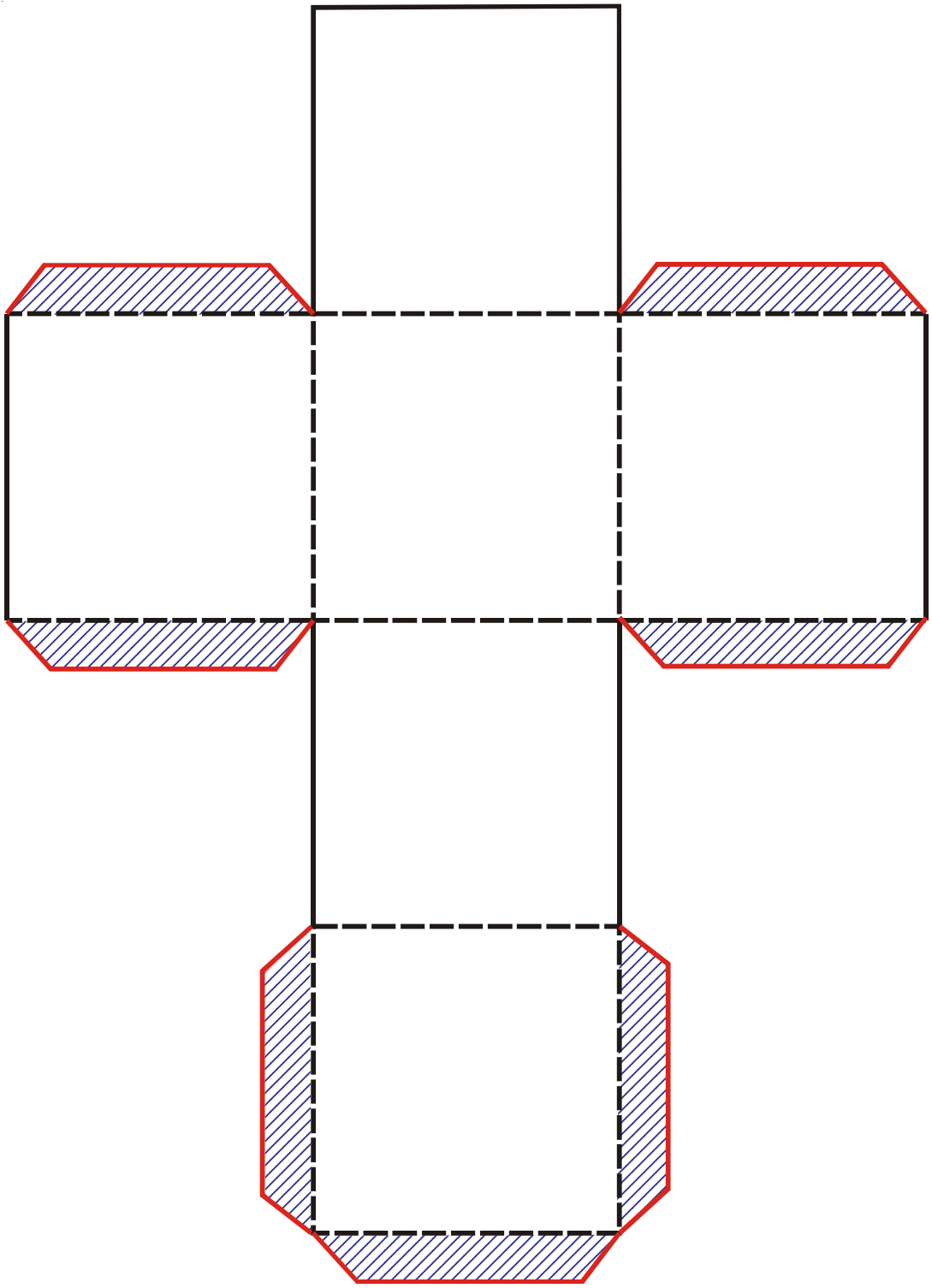
Print this page onto card.
Cut out the net and score along all the dotted lines with a compass point.
Put glue on the shaded tabs, fold and stick to make a **TETRAHEDRON**.



G12b

3D Shapes - Models

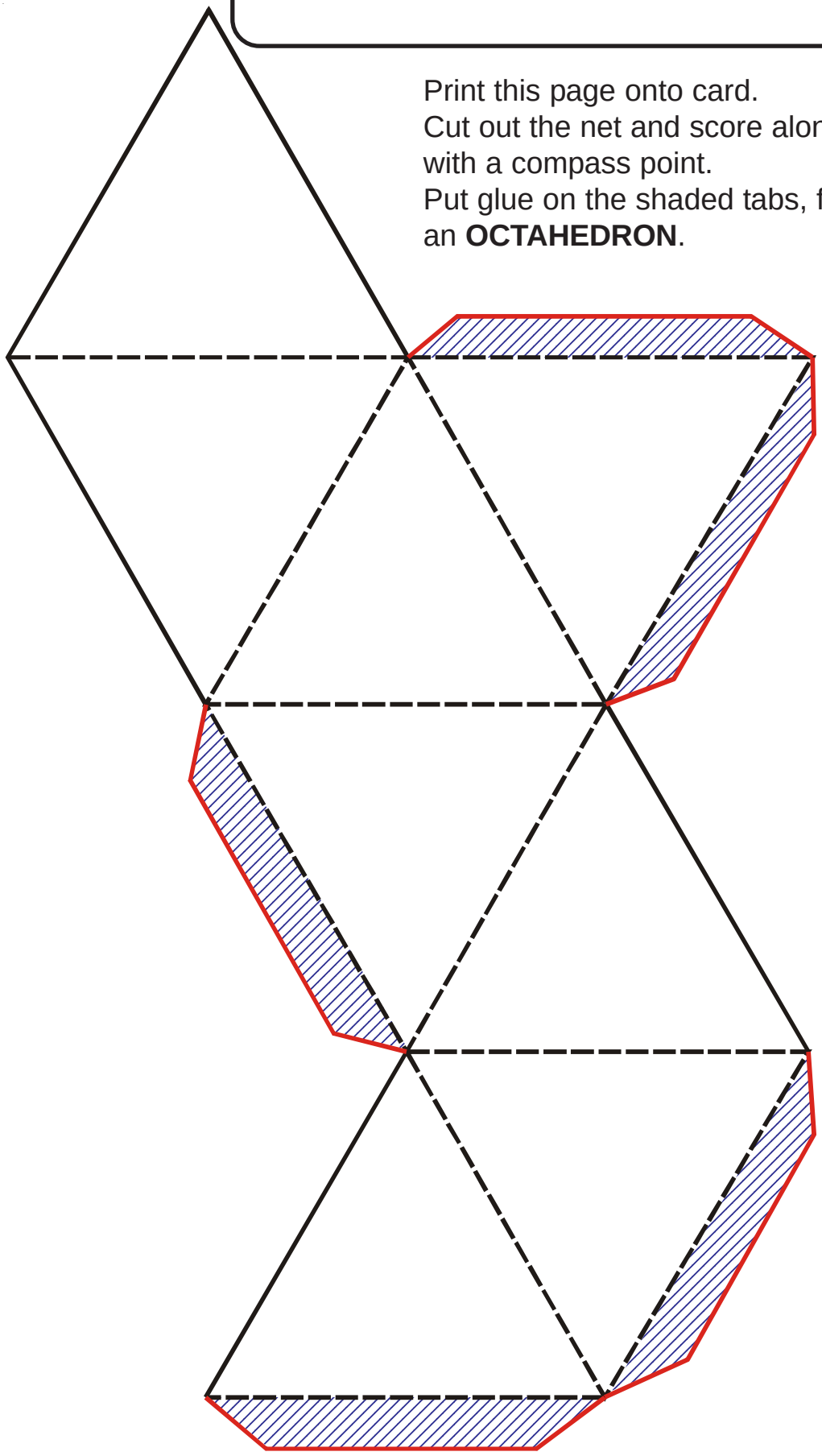
Print this page onto card.
Cut out the net and score along all the dotted lines with a compass point.
Put glue on the shaded tabs, fold and stick to make a **CUBE**.



G12b

3D Shapes - Models

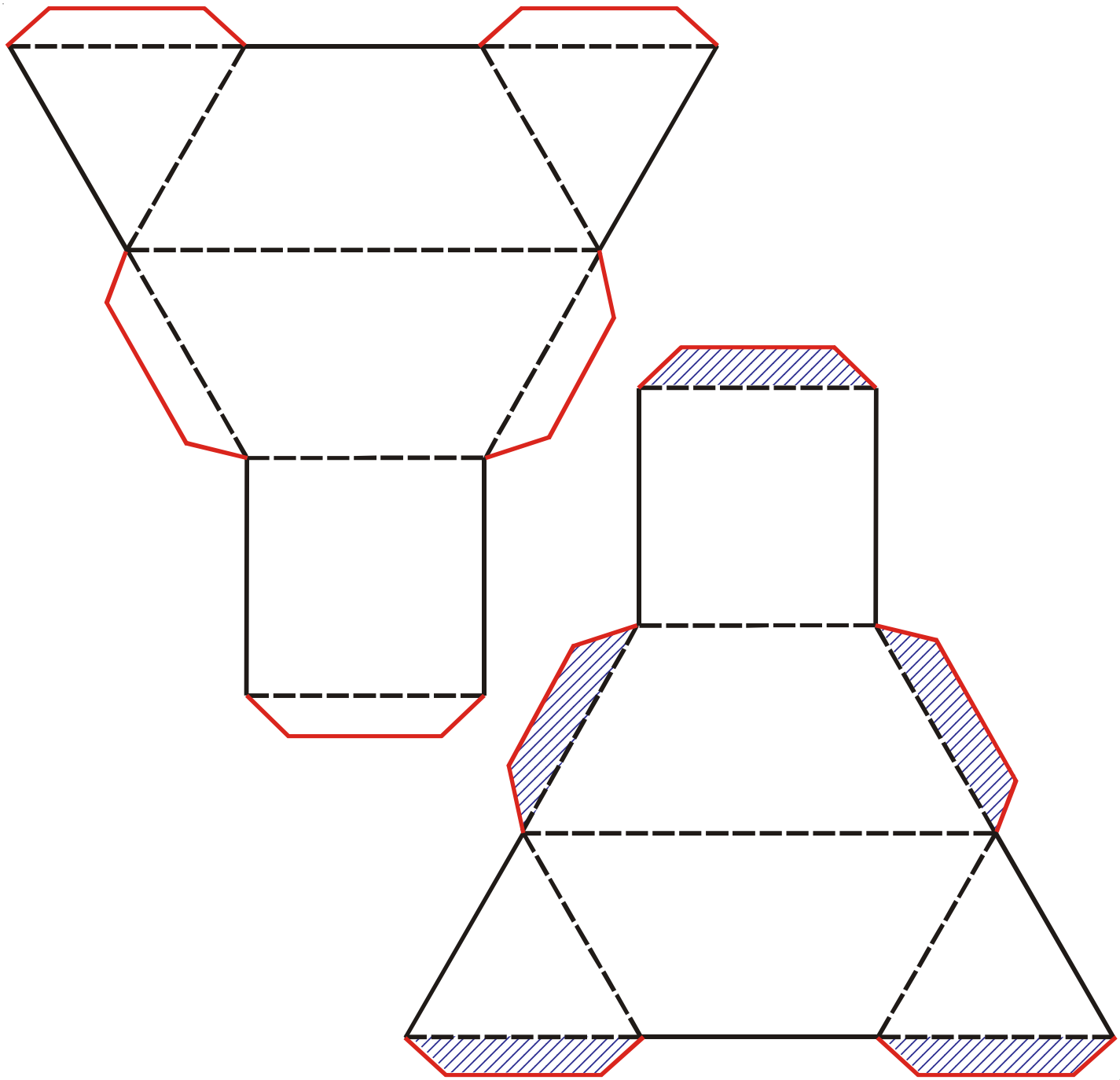
Print this page onto card.
Cut out the net and score along all the dotted lines with a compass point.
Put glue on the shaded tabs, fold and stick to make an **OCTAHEDRON**.



G12b

3D Shapes - Models

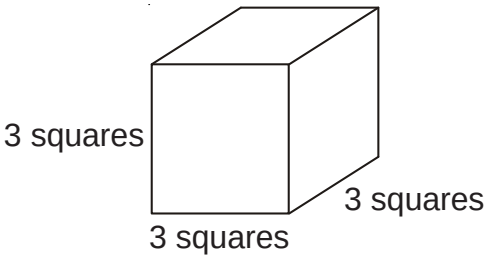
Print this page onto card.
Cut out, score and glue each net to make two 3D shapes.
You now have a two-piece jigsaw.
Can you fit both pieces together to make a TETRAHEDRON.
When you can do it, challenge other people to try.



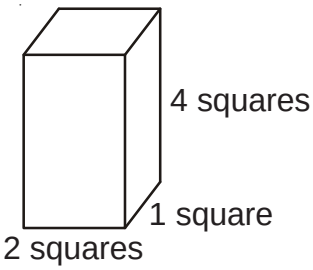
G12c

3D Shapes - Nets

a) Draw a net of this cube.

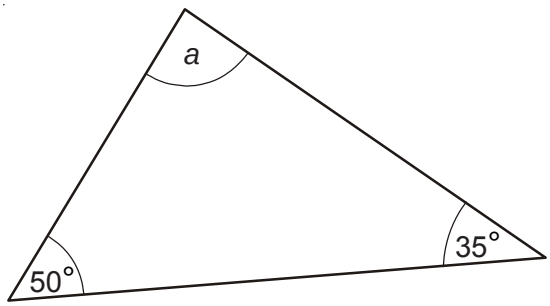


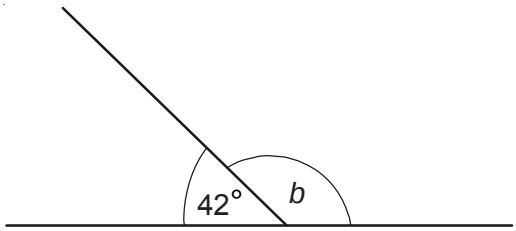
b) Draw a net of this cuboid.

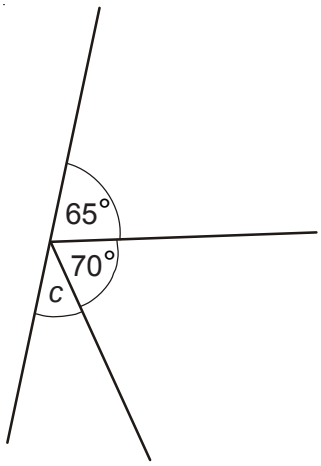


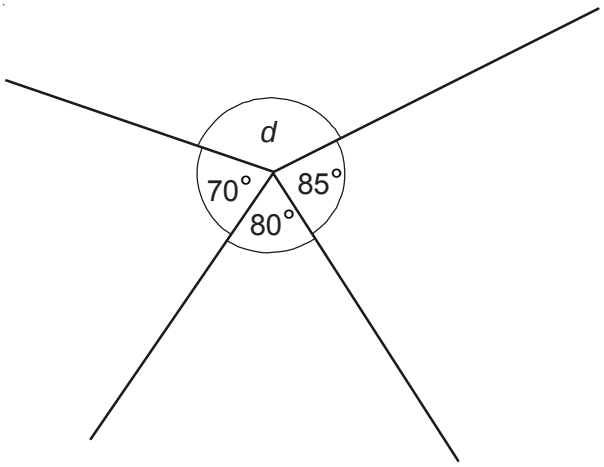
G13 Angle Facts

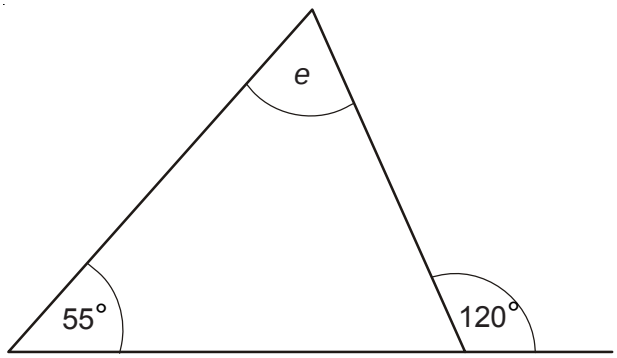
1) Work out the size of angles *a* to *h*.

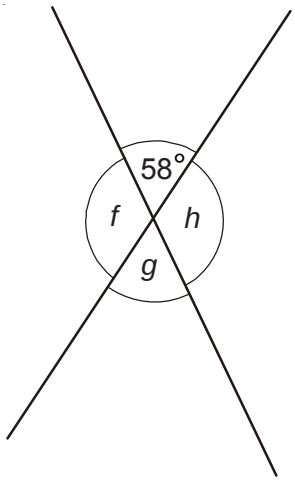








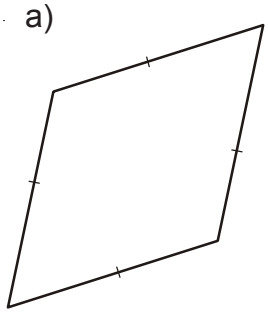




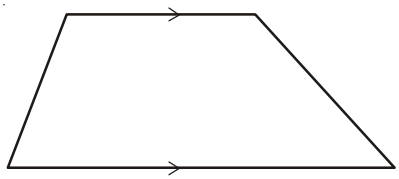
G14 Properties of Quadrilaterals

1) Write down the names of the quadrilaterals a) to g)

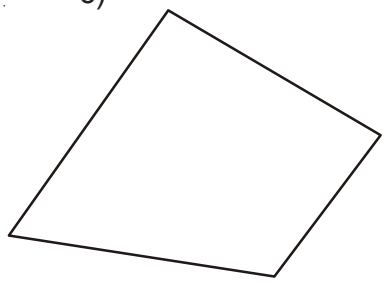
a)



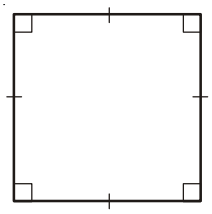
b)



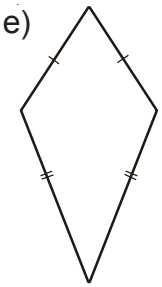
c)



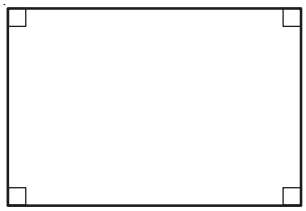
d)



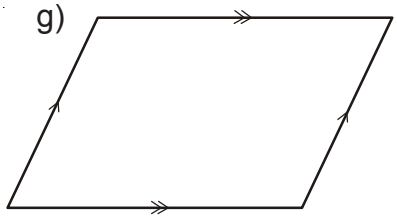
e)



f)



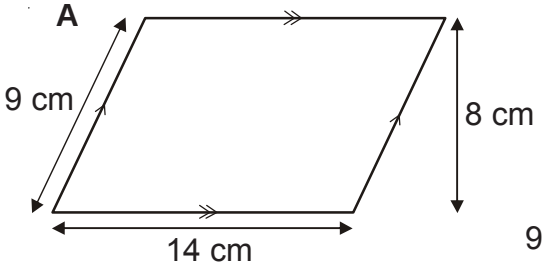
g)



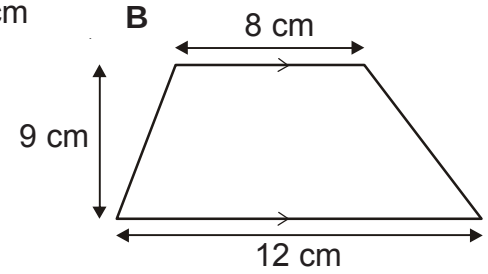
2) Fill in the table for quadrilaterals A, B and C.

Shape	*Number of lines of symmetry*	*Order of rotational symmetry*	*Area*
A			
B			
C			

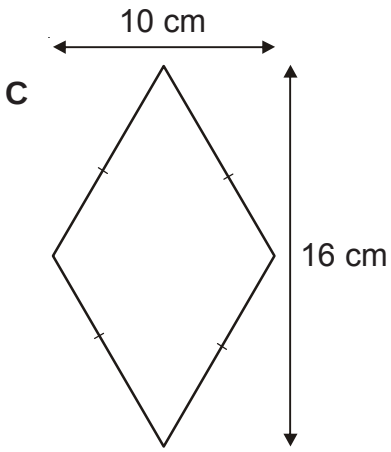
A



B



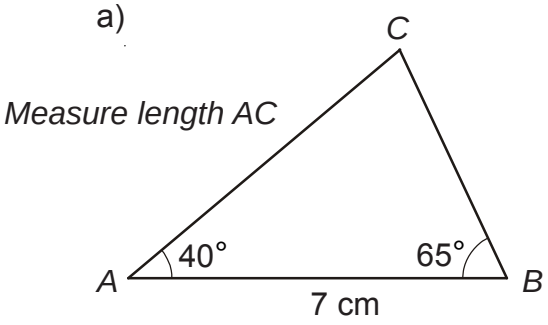
C



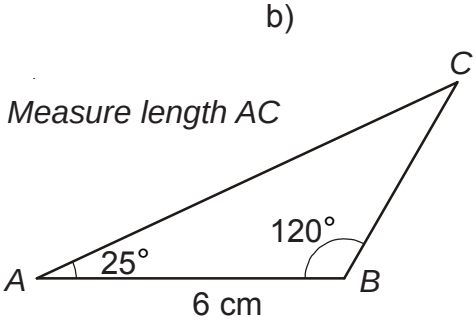
G15 Scale Drawings

1) Using only a ruler, protractor and pencil, draw the following diagrams accurately.
For each diagram measure and write down the side you are asked for.

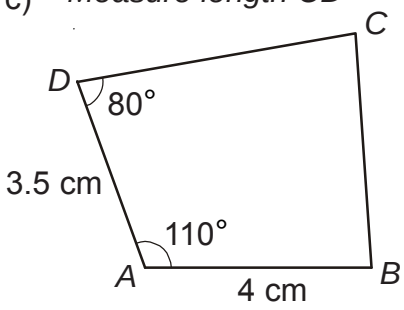
a)



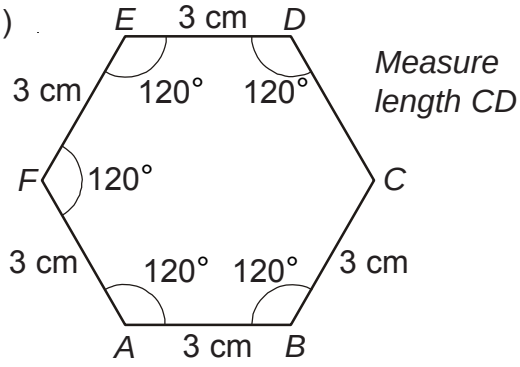
b)



c) Measure length CD

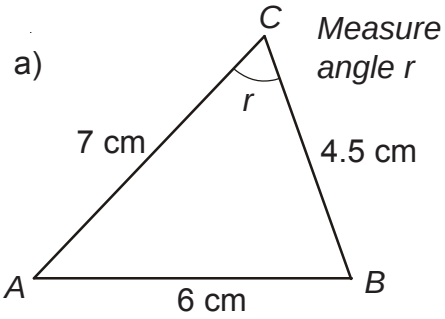


d)

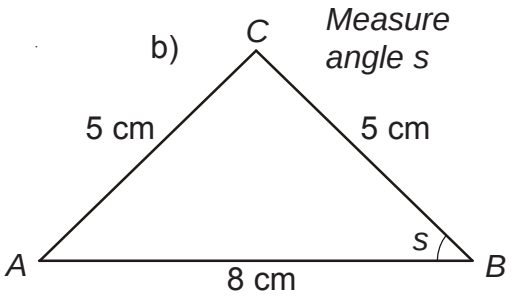


2) Using only a ruler, pencil, compasses and protractor as needed, draw the following diagrams accurately.
For each diagram, measure and write down the angle you are asked for.

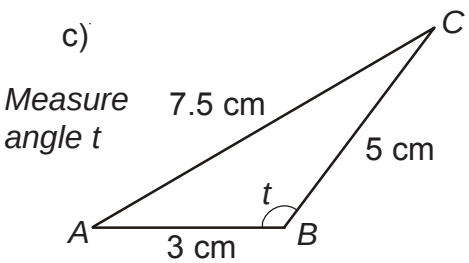
a)



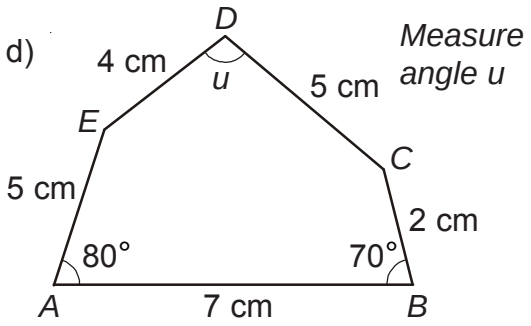
b)



c)

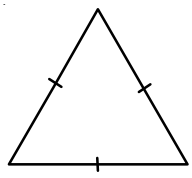


d)



G16 Properties of Special Triangles

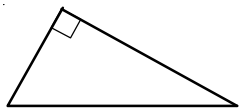
1) Write the special name for each type of triangle next to it and fill in the gaps in the description.

a) 

Name: _ _ _ _ _ _ _ _ _ _

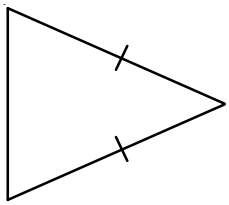
_ _ equal sides

_ _ equal angles

b) 

Name: _ _ _ _ _ _ _ _ _ _

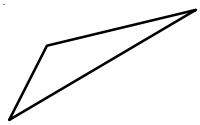
One angle of _ _

c) 

Name: _ _ _ _ _ _ _ _ _ _

_ _ equal sides

_ _ equal angles

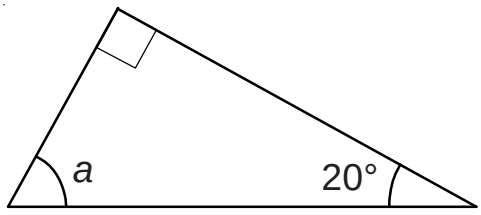
d) 

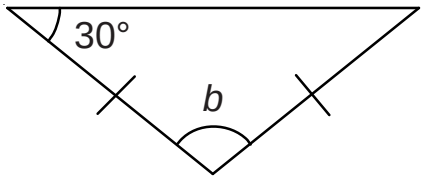
Name: _ _ _ _ _ _ _ _ _ _

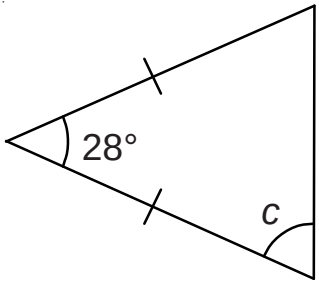
_ _ equal sides

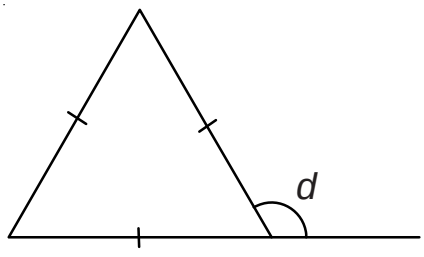
_ _ equal angles

2) Find the missing angles.



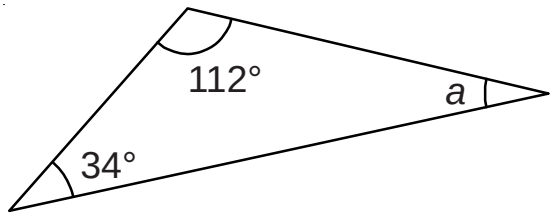


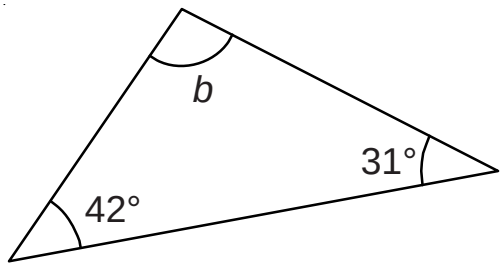




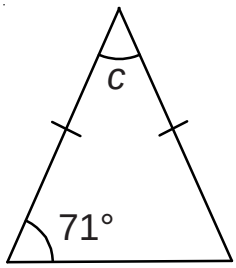
G17 Angles in a Triangle Calculation

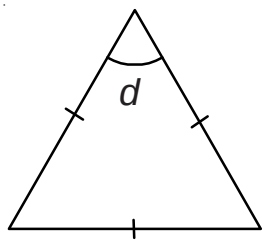
1) Work out the size of the missing angles.

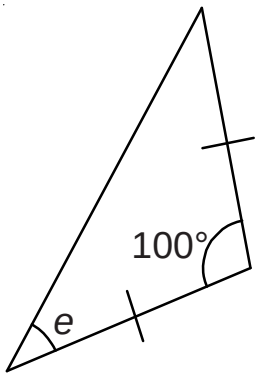




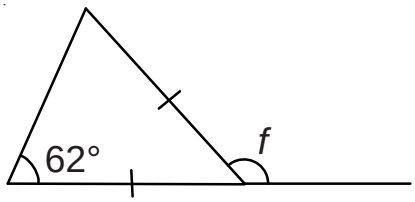
2) Work out the size of the missing angles.

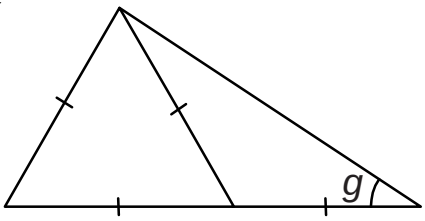


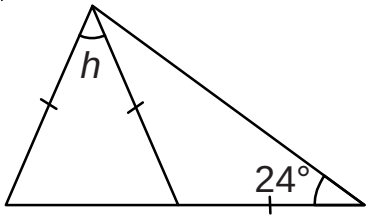




3) Work out the size of the missing angles.



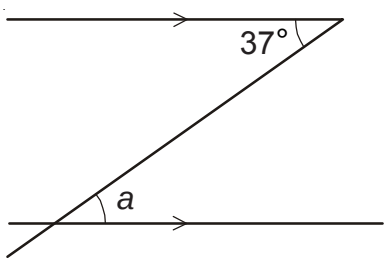


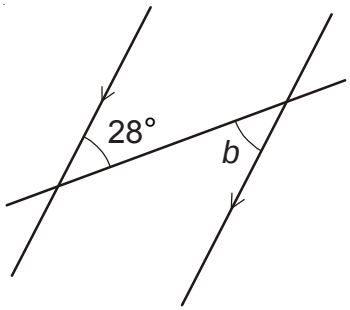


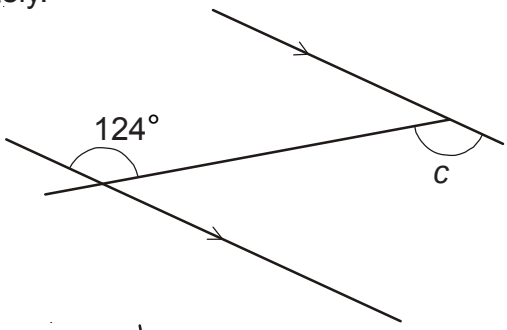
G18 Angles and Parallel Lines

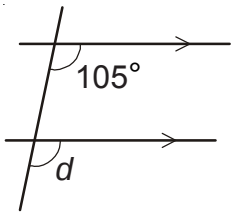
In every question below, calculate the missing angles indicated by the letters. None of the diagrams are drawn accurately.

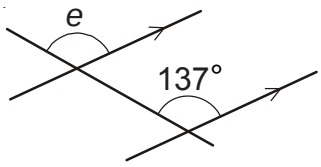
1)

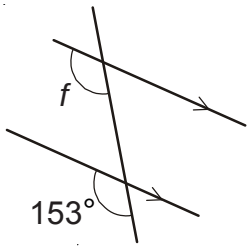




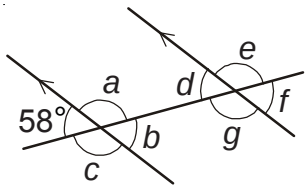


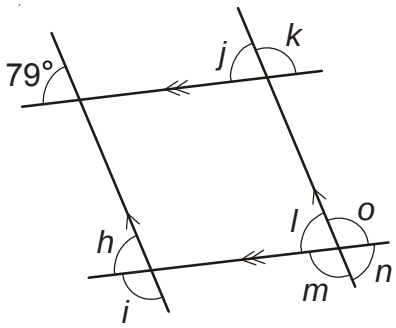


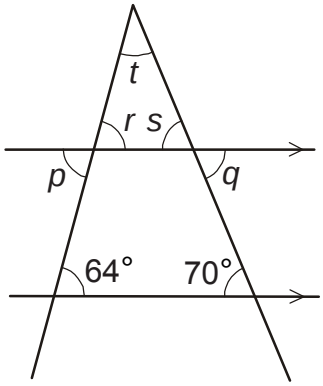




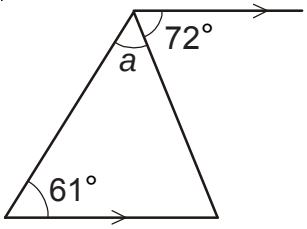
2)

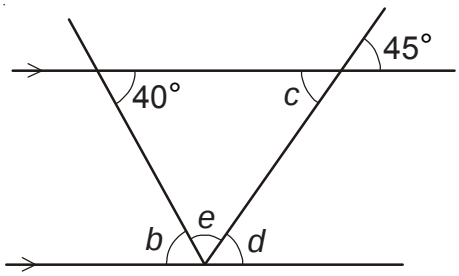




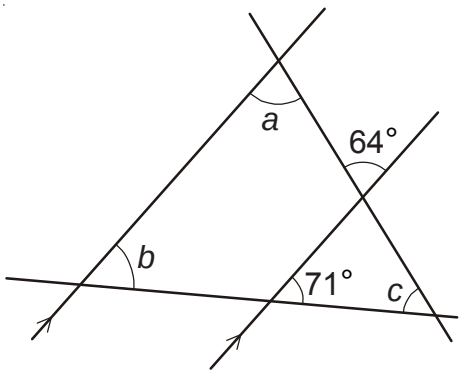


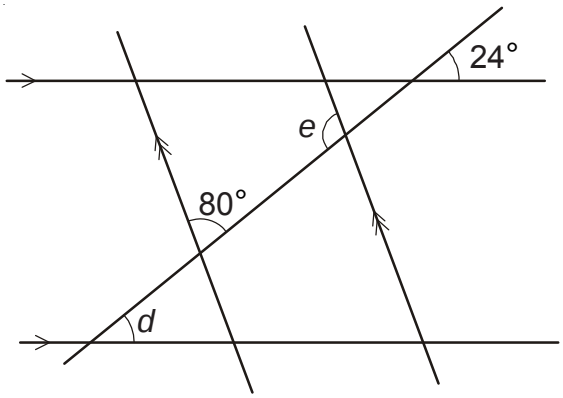
3)





4)





G19 Angle Sum of Polygons

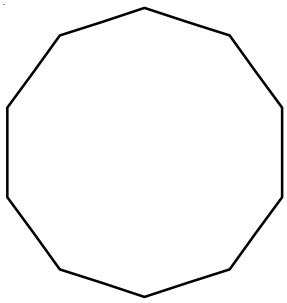
1) Find the sum of the interior angles of a nonagon (a 9-sided shape).

2) Find the sum of the interior angles of a 14-sided shape.

3) The sum of the interior angles of a polygon is 1620°.

   How many sides does it have?

4) Here is a regular decagon.



   a) What is the sum of the interior angles?

   b) Find the size of one interior angle.

   c) Find the size of one exterior angle.

5) A regular polygon has interior angles of size 135°.

   a) How many sides does it have?

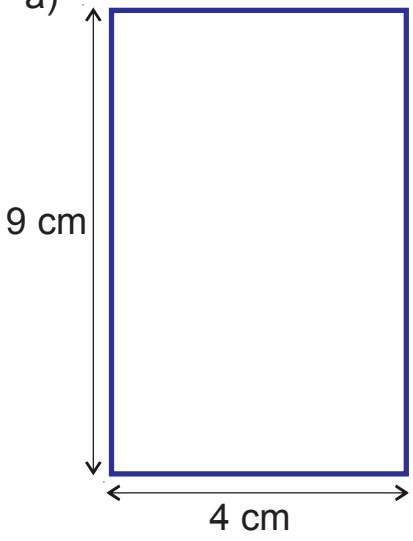
   b) What is its name?

G20a

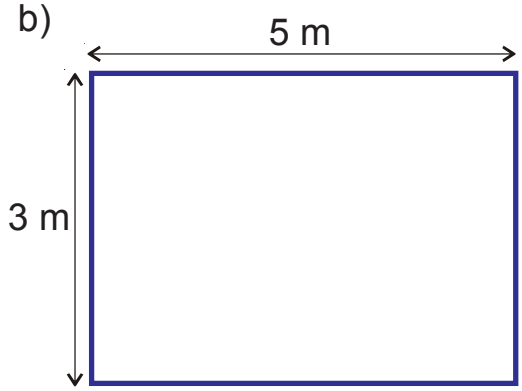
Area - Rectangles

1) Find the areas of the following four rectangles.

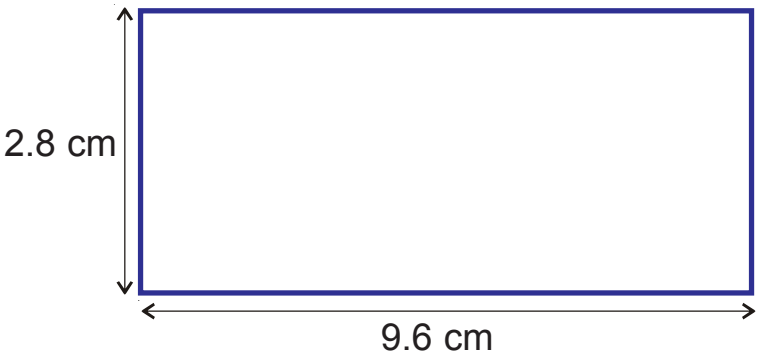
a)



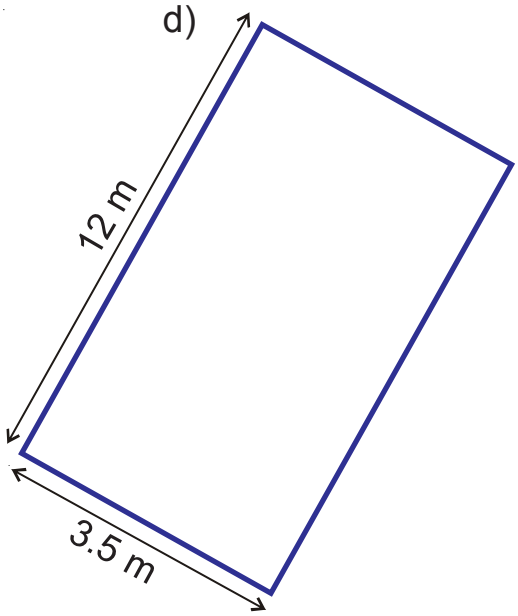
b)



c)

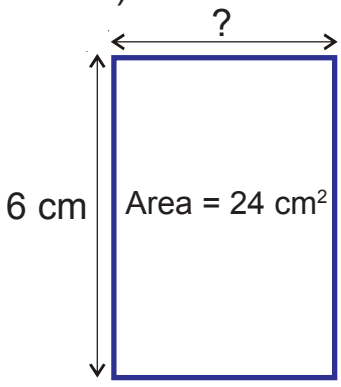


d)

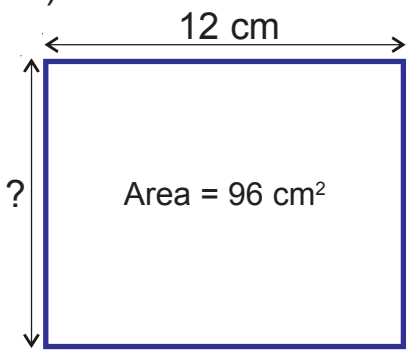


2) Find the lengths of the missing sides.

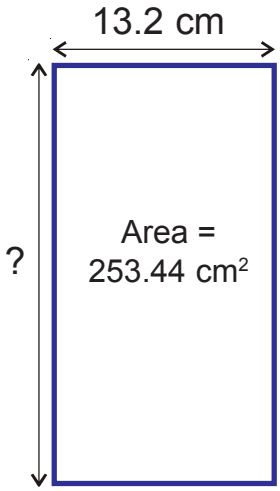
a)



b)



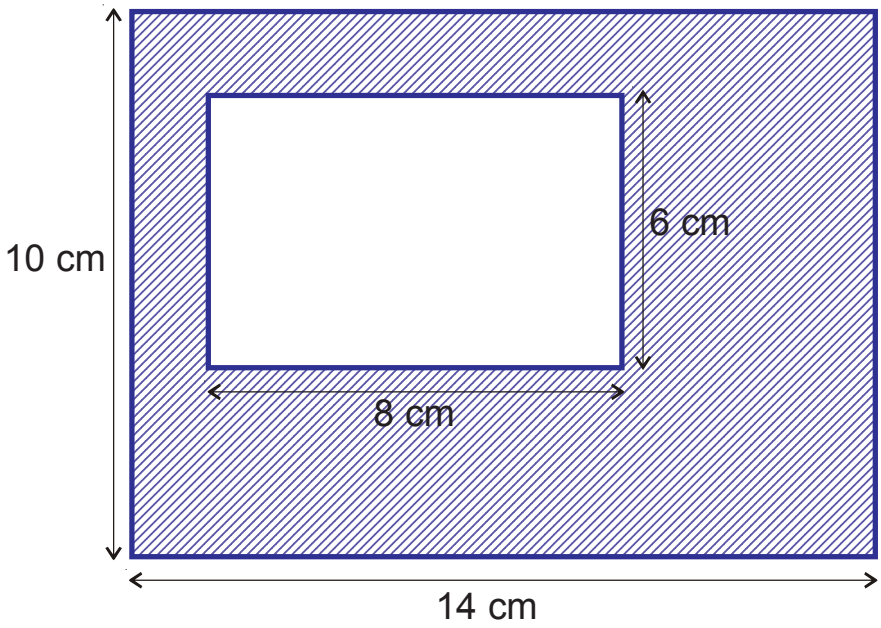
c)



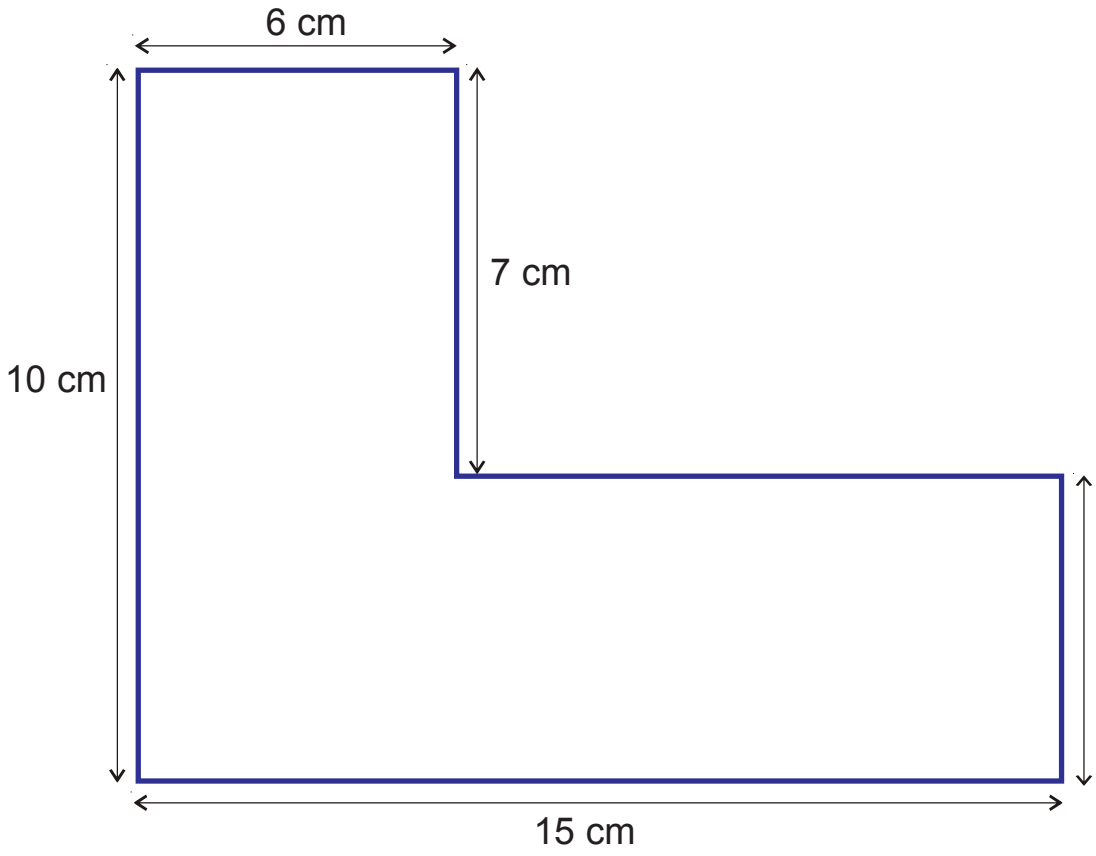
G20a

Area - Rectangles

1) Find the area of the shaded section.



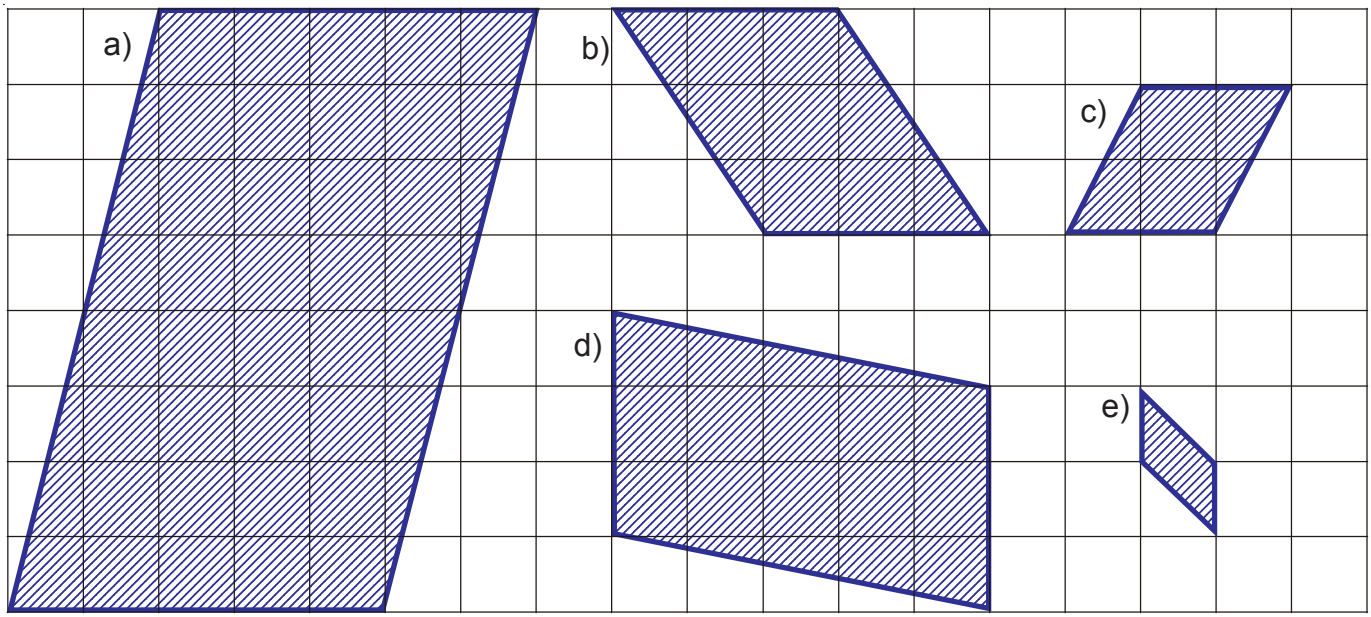
2) Find the area of the shape below.



G20b

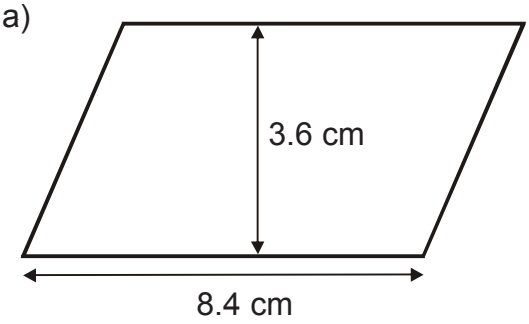
Area - Parallelograms

1) Find the areas of the five parallelograms on this cm square grid.

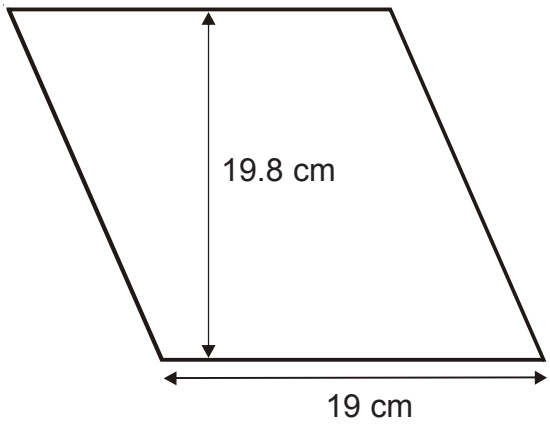


2) Find the areas of these four parallelograms

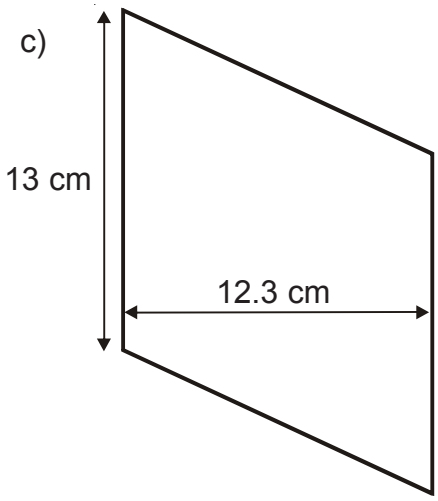
a)



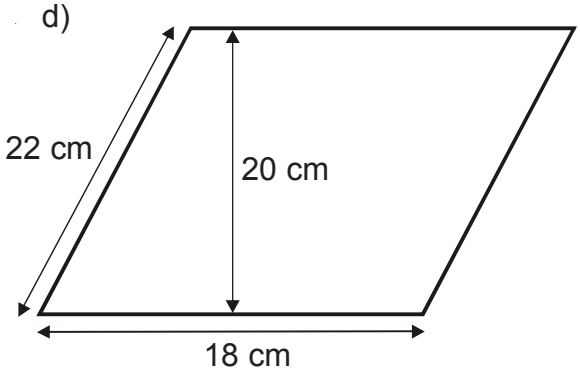
b)



c)



d)

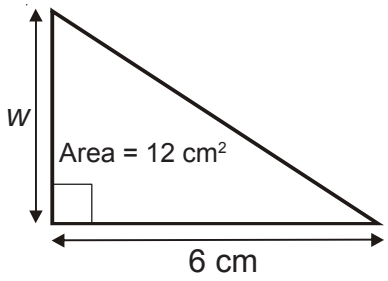


G20c

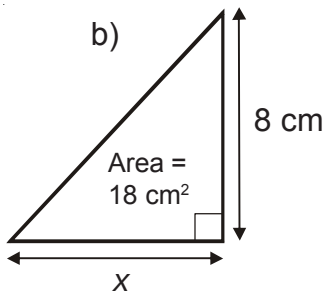
Area - Triangles

1) Find the lengths *w*, *x*, *y* and *z*

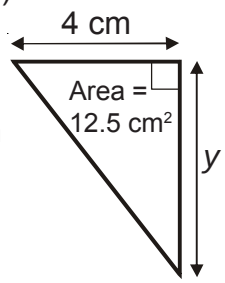
a)



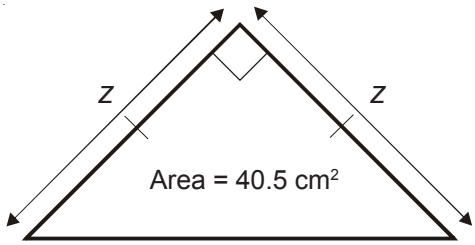
b)



c)

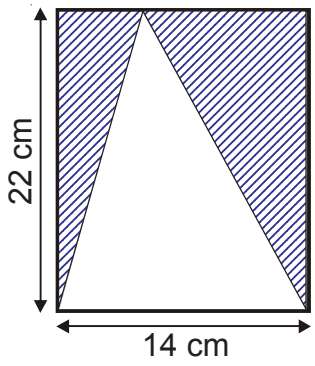


d)

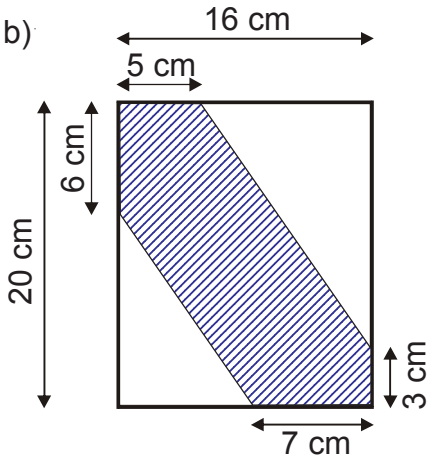


2) Find the areas of the following shaded parts of rectangles

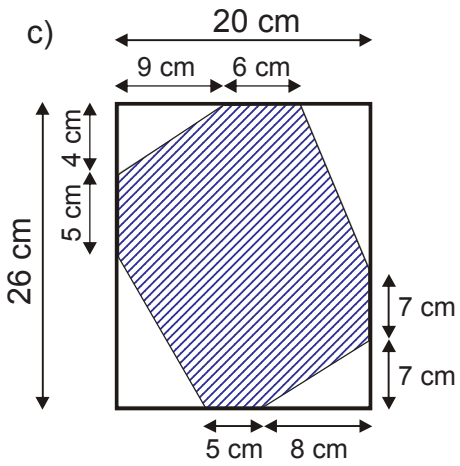
a)



b)

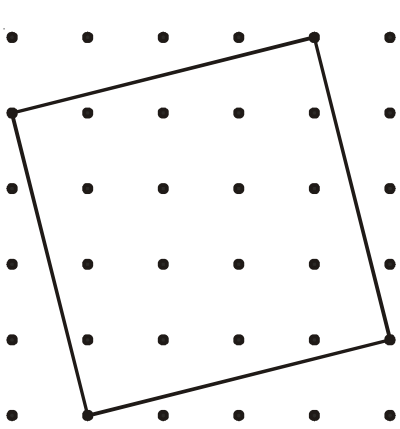


c)

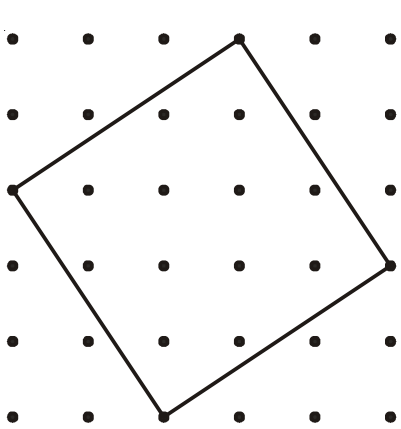


3) The two squares are drawn on 1 cm square grids.
Find the areas of the squares.

a)



b)

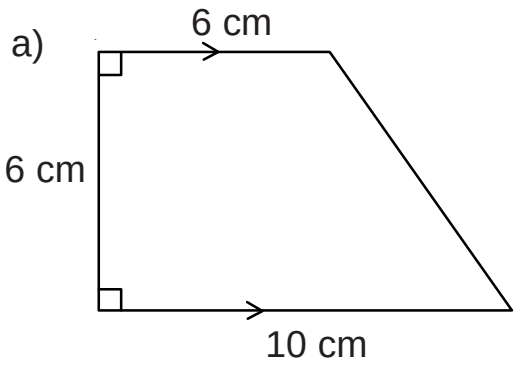


G20d

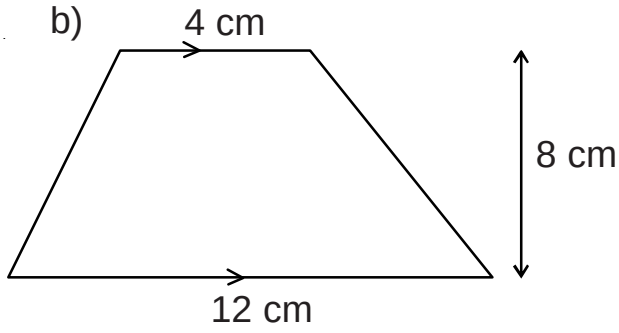
Area - Trapeziums

1) Find the area of the following trapeziums:

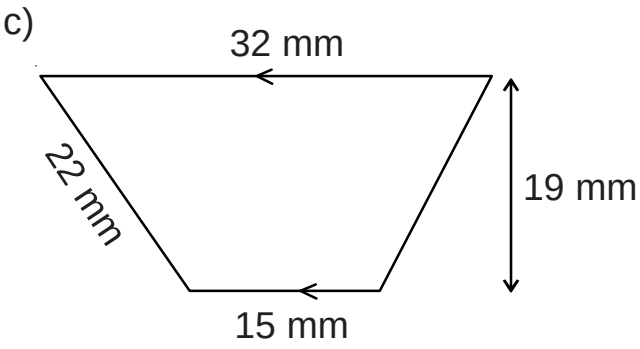
a)



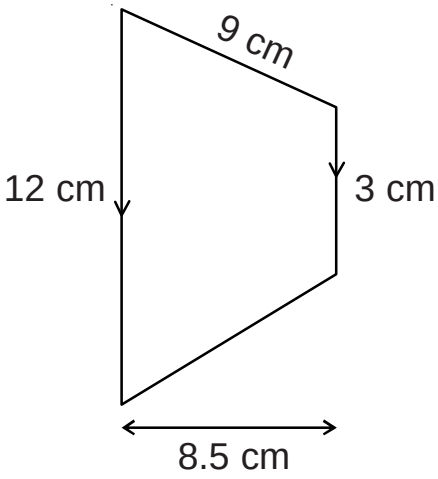
b)



c)

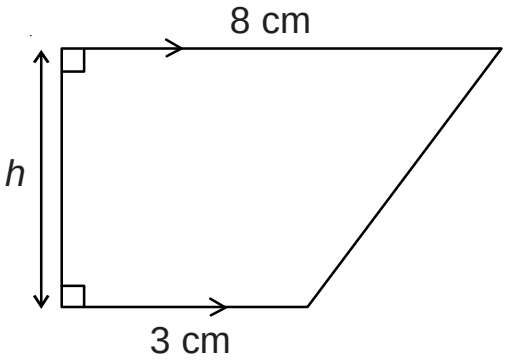


d)

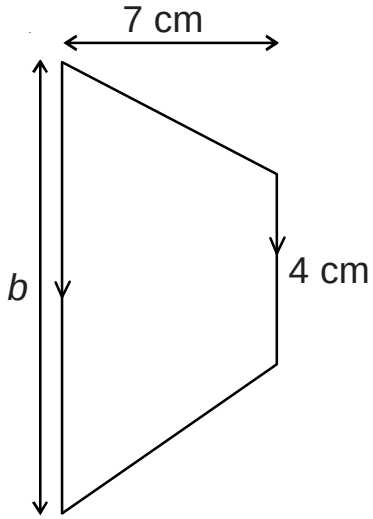


2) Find the missing lengths.

a) area = 38.5 cm^2



b) area = 59.5 cm^2



P2a Outcomes - Basics

Work out an exact probability (as a fraction) for these events:

a) If you flip a coin you will get a ‘head’.

b) If you flip two coins you will get two ‘heads’.

c) If you roll a dice you will get a 6.

d) If you roll two dice you will get two 6’s.

e) If you flip a coin and roll a dice you will get a ‘head’ and a 6.

f) If you flip three coins you will get three ‘heads’.

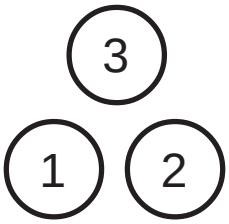
g) If you flip three coins you will get two ‘heads’ and a tail in any order.

h) If you flip three coins you will get at least one ‘head’.

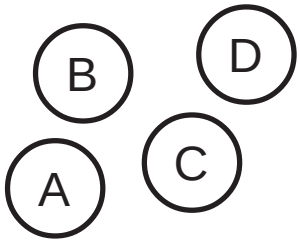
i) If you roll two dice and add the scores together you will get a total of 4.

P2b Outcomes Harder Questions

1) A counter is taken at random from set 1 followed by another counter at random from set 2.



Set 1



Set 2

a) Write down all the possible pairs of counters that may be chosen.

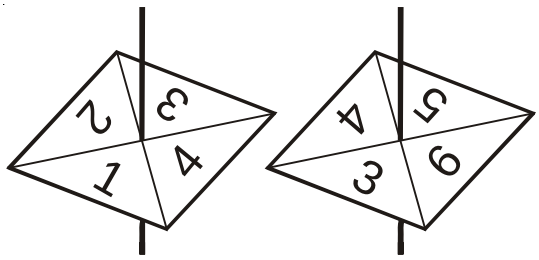
b) What is the probability that 3B will be picked?

c) What is the probability that any pair of counters will be chosen **except** 3B?

d) What is the probability that the pair of counters chosen will include an odd number?

2) The two spinners on the right are spun and their scores added together to give a total.

a) Draw a possibility space to show all the totals.



b) What is the probability of scoring a total which is bigger than 5?

P3 Mutually Exclusive Events

1) Every Tuesday the main school dinner is either Sausages, Chicken, Pizza or Tuna.

Use the table below to work out the probability that the main dinner will be Pizza next Tuesday.

School dinner	Sausages	Chicken	Pizza	Tuna
Probability	0.24	0.18	?	0.47

2) Every Wednesday the main school dinner is either Sausages, Chicken, Pizza or Tuna.

The probability of it being Sausages is exactly the same as the probability it will be Tuna.

Use the table below to work out the value of the probabilty x.

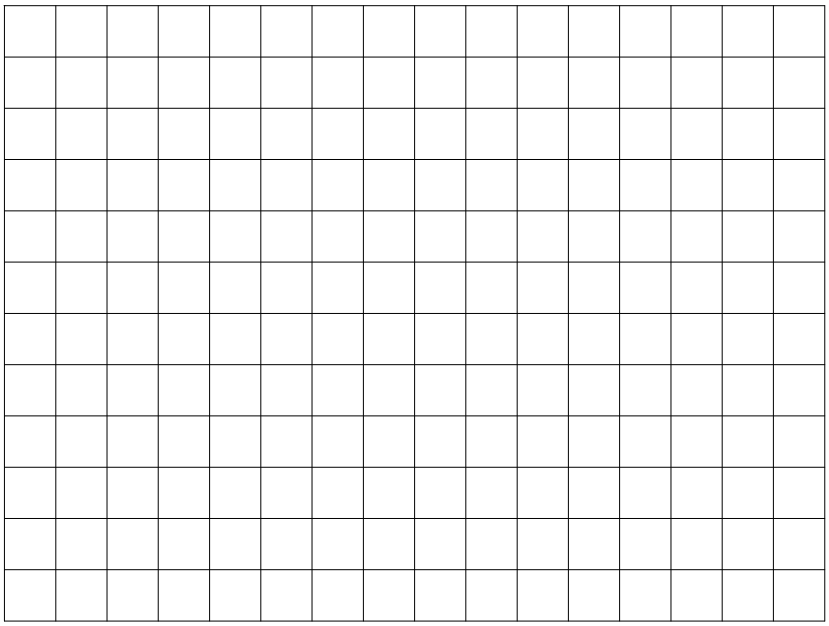
School dinner	Sausages	Chicken	Pizza	Tuna
Probability	x	0.41	0.35	x

S5 Frequency Diagrams

1) A group of pupils were asked for their favourite colour.
Here are the results.

Draw a suitable chart to show this information.

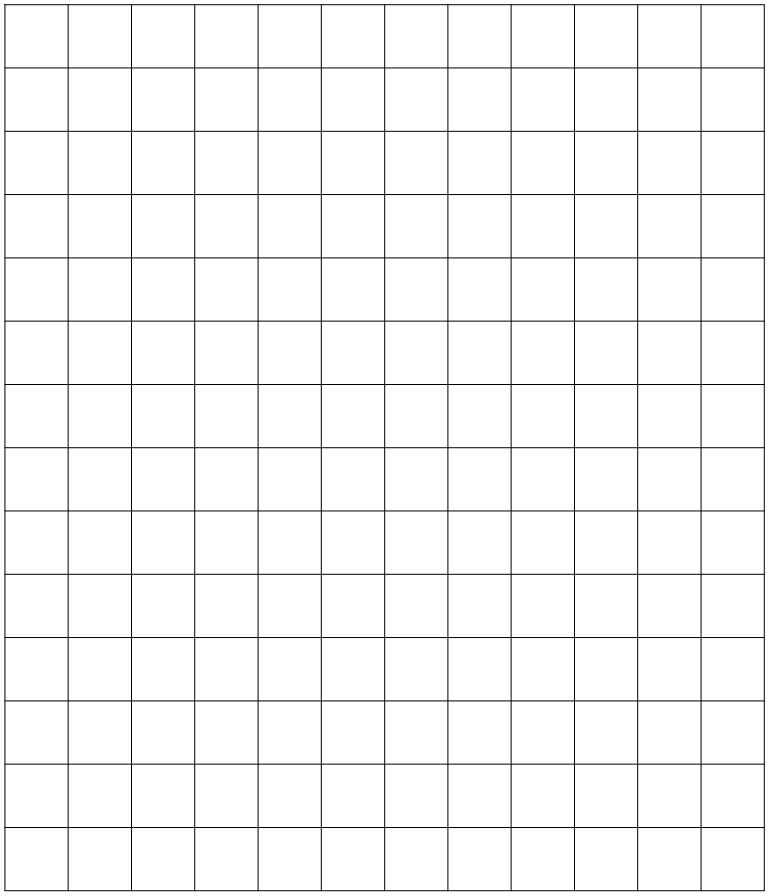
Colour	Frequency
Red	8
Blue	10
Purple	9
Green	4
Yellow	7



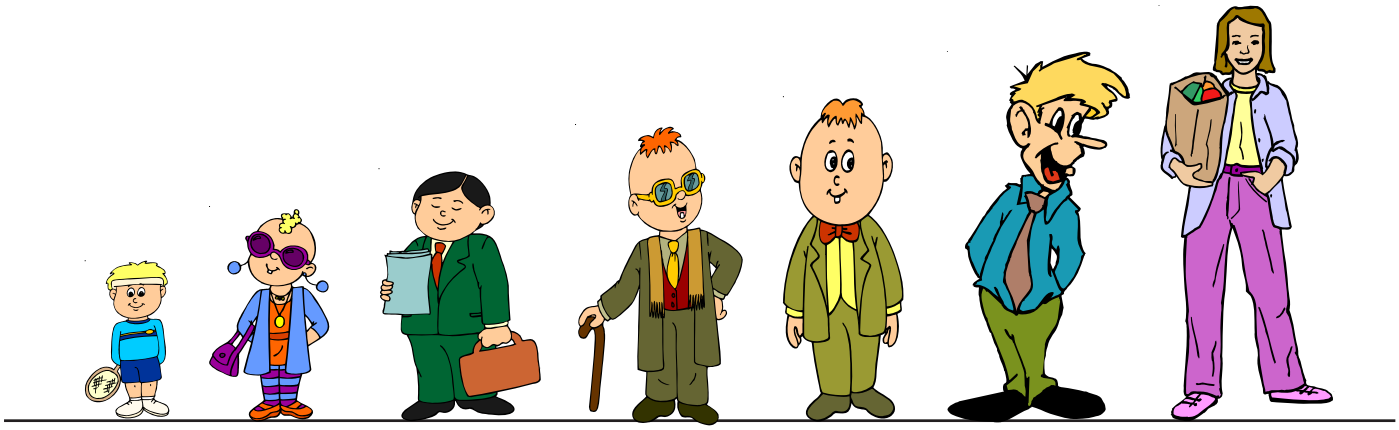
2) A group of people were given a puzzle to solve.
The time taken by each individual to complete the puzzle was recorded in the table below.

Draw a suitable chart to show this information.

Time in mins	Frequency
$0 \leqslant t < 10$	5
$10 \leqslant t < 20$	6
$20 \leqslant t < 30$	12
$30 \leqslant t < 40$	11
$40 \leqslant t < 50$	10



S6 Median, Mode and Range



1) a) In this group of seven people, which one has the median average height?

   b) What are the names of the people who are below the median average height?

   c) To find the range of the heights you would need to measure the height of two people. Which two?

2) A class of students were asked how many pets they own.

   The answers were as follows:

   1, 0, 1, 2, 1, 5, 2, 0, 1, 2, 3, 1, 4

   2, 3, 1, 2, 2, 0, 1, 1, 2, 1, 3, 2

   a) Find the median average number of pets per student.

   b) Which number of pets is the mode?

   c) What is the range of the answers?

3) Twenty children were asked what their favourite colour was.

   Their answers were:

   Blue, Red, Yellow, Red, Green, Red, Green, Blue, Red, Blue

   Green, Blue, Red, Blue, Yellow, Red, Blue, Orange, Red, Red

   a) Which colour is the modal average?

   b) Why can't we find the median colour?

S6 Median, Mode and Range

1) The heights of 18 plants, to the nearest cm, are as follows:

15, 19, 16, 12, 13, 15, 20, 18, 16, 14, 12, 18, 16, 16, 17, 15, 15, 15

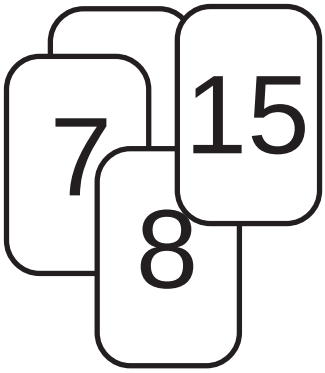
a) Find the modal height of the plants.

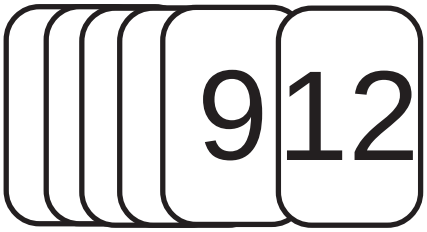
b) Find the median height of the plants.

c) Find the range of the heights.

2) You are told that the median score on these four cards is 9.5

Work out what the number is on the bottom card.





3) We have six cards with numbers on them and we know the following:

the modal average is 3

the median average is 5

the range is 11

Work out the numbers on the other four cards.

4) Sue rolls a dice 23 times and puts her scores into a table.

a) What is Sue's modal score?

b) What is Sue's median score?

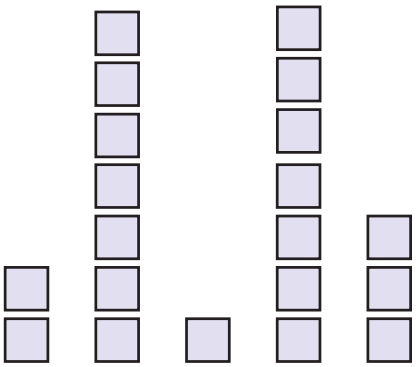
c) What is the range of Sue's scores?

Score	Frequency
1	2
2	3
3	3
4	4
5	4
6	7

S7 The Mean Average

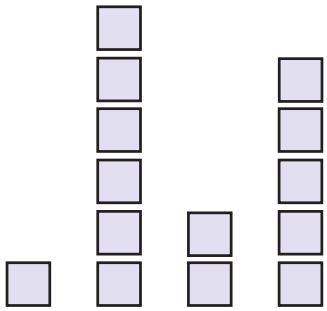
1) a) Move blocks around so that the heights of the five towers are the same.

b) What is the mean average number of blocks in each tower?



2) a) Move blocks around so that the heights of the four towers are the same (you may have to cut some blocks).

b) What is the mean average number of blocks in each tower?



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3) In a spelling test, the results for the class (out of 10) are:

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

a) Work out the mean average score for the class.

b) How many children had a score below the mean average?

4) Two Year 6 classes had a 'times table test' which was marked out of 20.

The marks in David's class were:

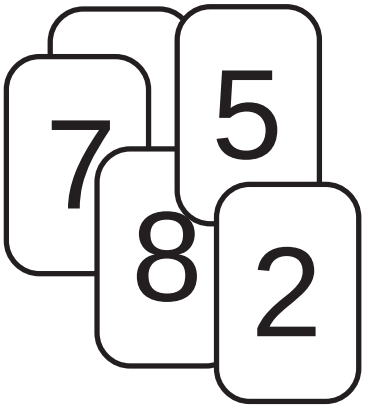
14, 12, 19, 20, 20, 15, 14, 12, 13, 3, 18, 19, 16, 14, 12, 6

Harry was in the other class and the marks were:

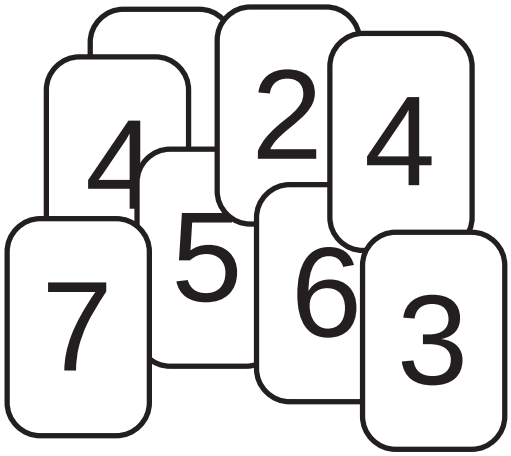
9, 12, 17, 17, 16, 14, 18, 20, 8, 13, 16, 14, 18, 8

Use the mean average to work out which class did better in the test.

S7 The Mean Average



1) If the mean average number on these five cards is 6, what is the number on the bottom card?



2) If the mean average number on these eight cards is 4.25, what is the number on the bottom card?

3) John rolled a dice thirty times and put the results into this table.

Score	Frequency
1	4
2	3
3	5
4	6
5	4
6	8

Work out his mean average score.

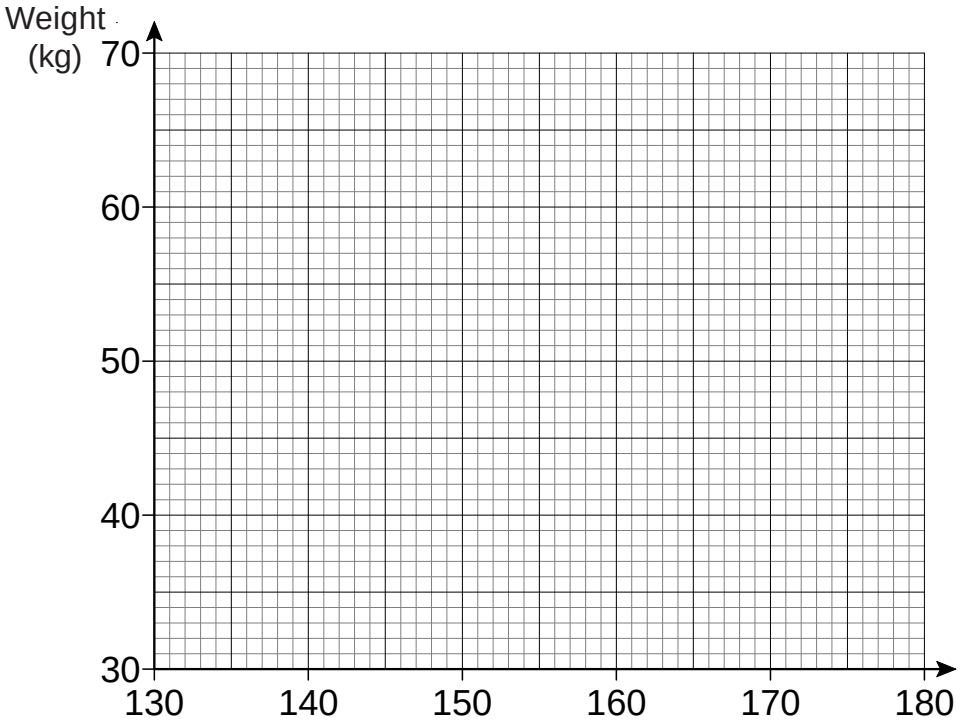
4) What is the mean average number of arms per person in Britain?

5) Can you find out the mean number of children per family in the UK?

S8 Scatter Diagrams

1) The heights and weights of some children are shown in the table, below.

Height (cm)	132	145	150	140	175	168	177	162	170	162	165	149	150	135	159	160
Weight (kg)	34	40	43	35	60	54	62	51	57	51	58	40	41	33	44	50



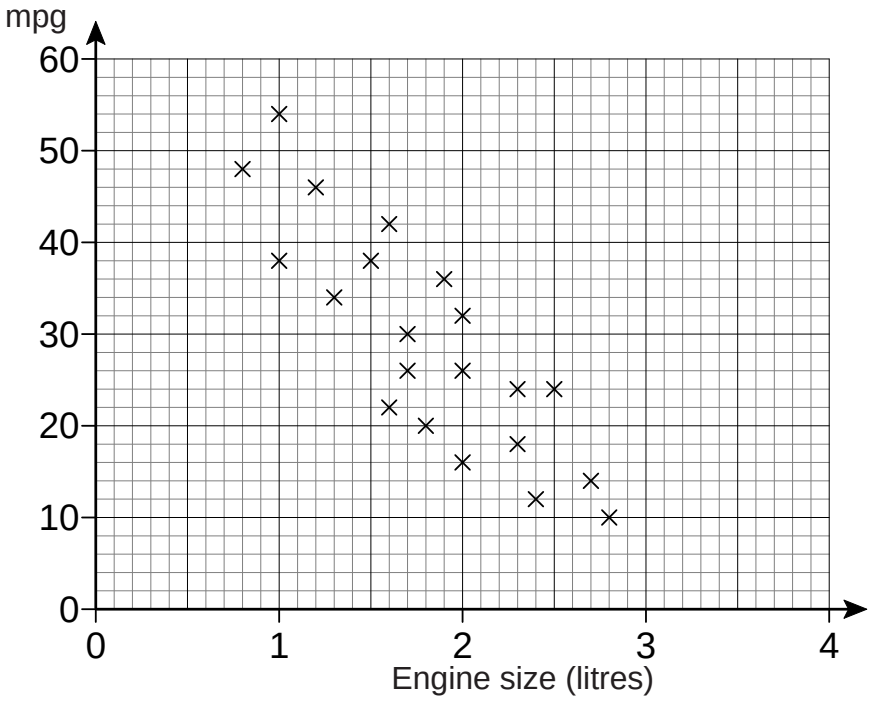
a) Plot the information from the table.

b) Describe the correlation between height and weight.

c) Draw a line of best fit.

d) Estimate the weight of a child of similar age to the group above with a height of 155 cm.

2) The scatter graph below relates car engine sizes to their fuel consumption in mpg.



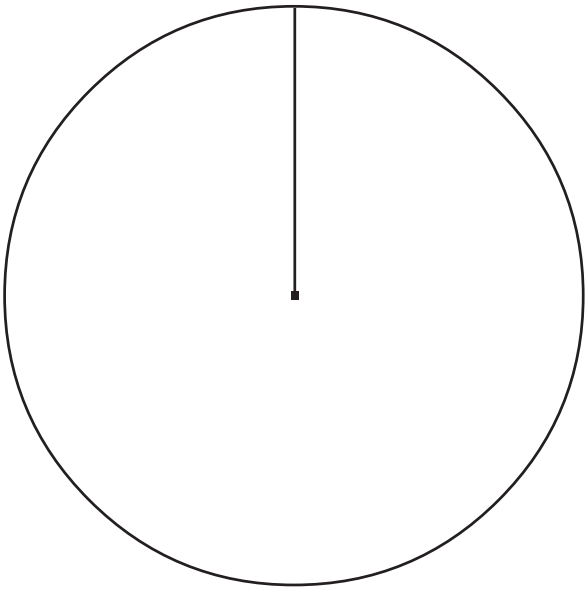
a) Describe the correlation shown by the data.

b) A car has an mpg of 25. Estimate the engine size.

S9 Pie Charts

1) The table on the right shows how far 90 visitors to a museum have travelled.
Draw a pie chart to show this information.

Distance	Frequency
Within the city	13
Within 30 miles of the city	9
Over 30 miles from the city	20
Overseas	48



2) The table shows the land usage of a farm.
Draw a pie chart to show this information.

Land usage	Area (hectares)
Arable	80
Pasture	70
Woodland	50
Waste	40