Emerging

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

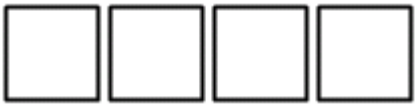
1) Match the words with the correct numbers.

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

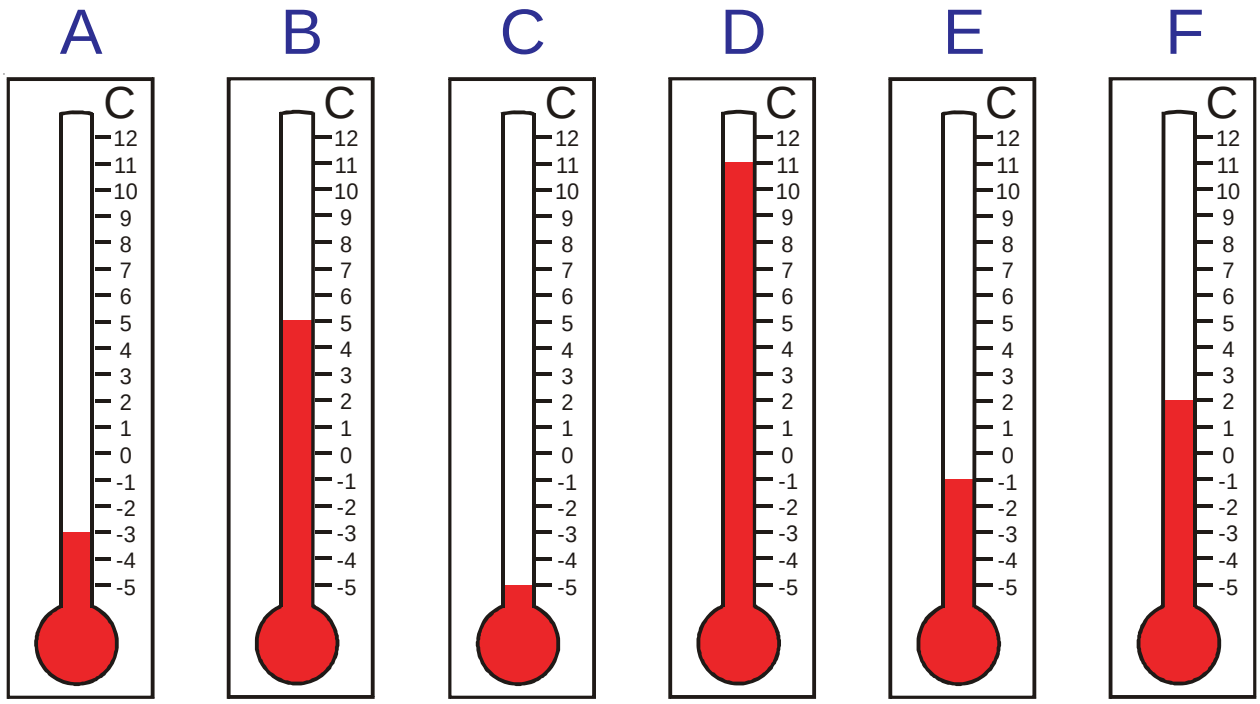
   c) 7 L to mL

   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

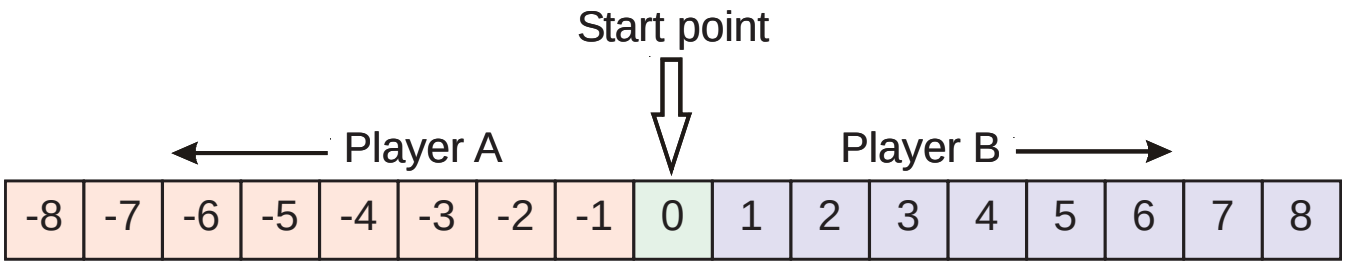
d) 1, -3, 4, -6, 8, -9, -4

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

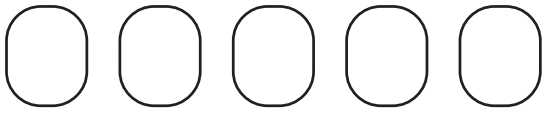
___ ___ ___ ___ ___

N2b Ordering Numbers - Decimals

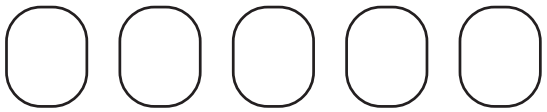
1) Here are some number cards.

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?

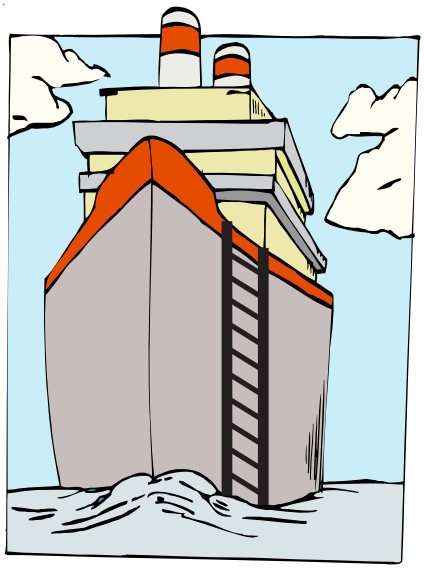
4) In the table, work out what each item should be measured in.
Your choices are mm, cm, m, km, g, kg, ml or l.

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.

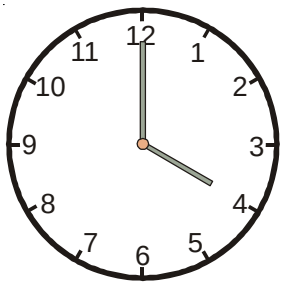
The tide is coming in and the water is rising at the rate of 20 cm per minute.

How many rungs will be visible after 9 minutes?

N7b Units - Time

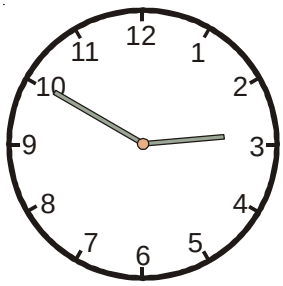
1) Write these times as 24 hour clock times

a)



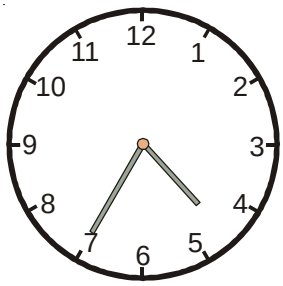
a.m.

b)



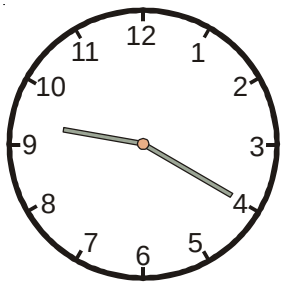
p.m.

c)



p.m.

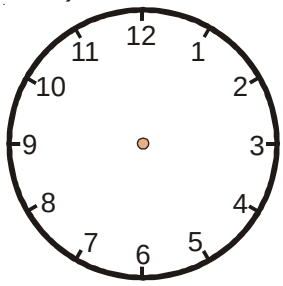
d)



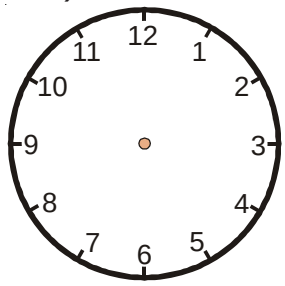
p.m.

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

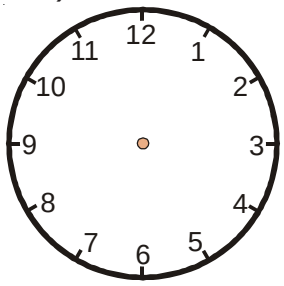
a) 09:40



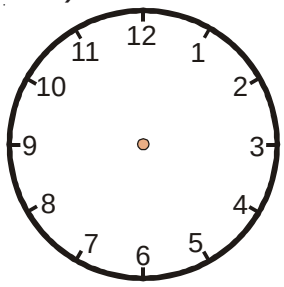
b) 18:10



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

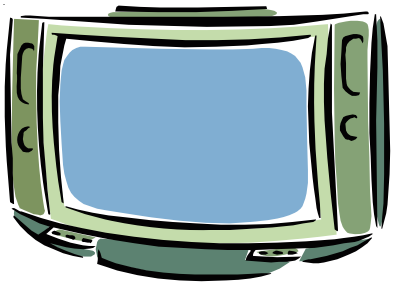
1) Write the following amounts of money using a £ sign and numbers.
   a) Three pounds and thirty seven pence.
   b) Twenty four pounds and fifty pence.
   c) Two hundred and five pounds.
   d) Nine pounds and sixty pence.
   e) Nine pounds and six pence.
   f) Forty eight pence.

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.

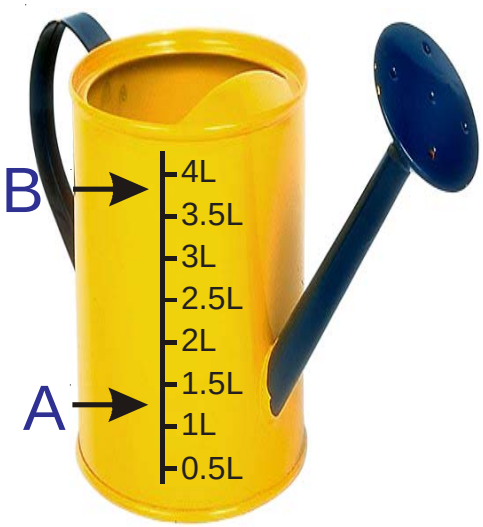
But £30 was handed over in the first place.

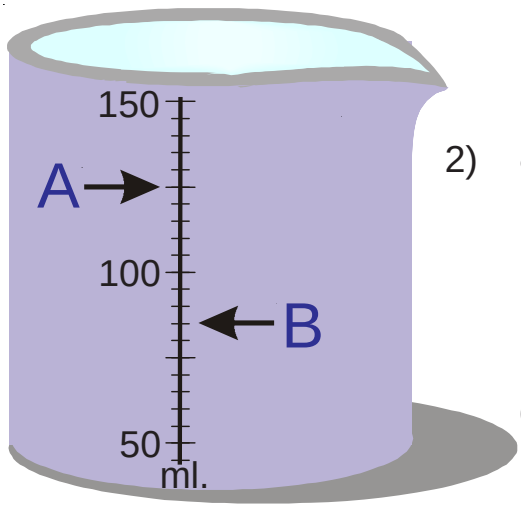
WHERE IS THE MISSING £1?

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?

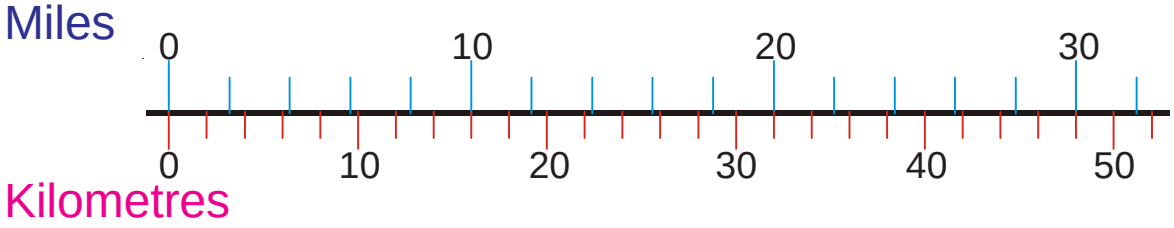




2) a) If milk comes up to arrow A, how much milk will there be in the container?

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.

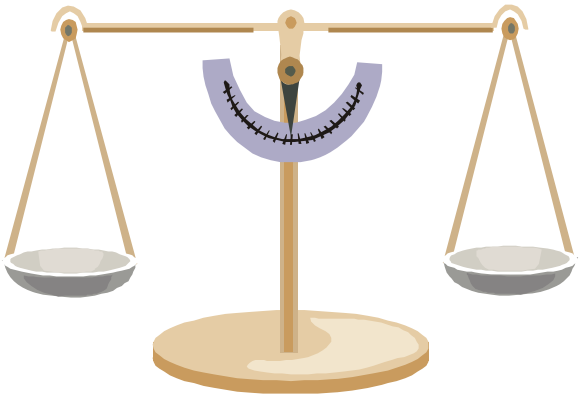
b) 40 km to miles.

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?



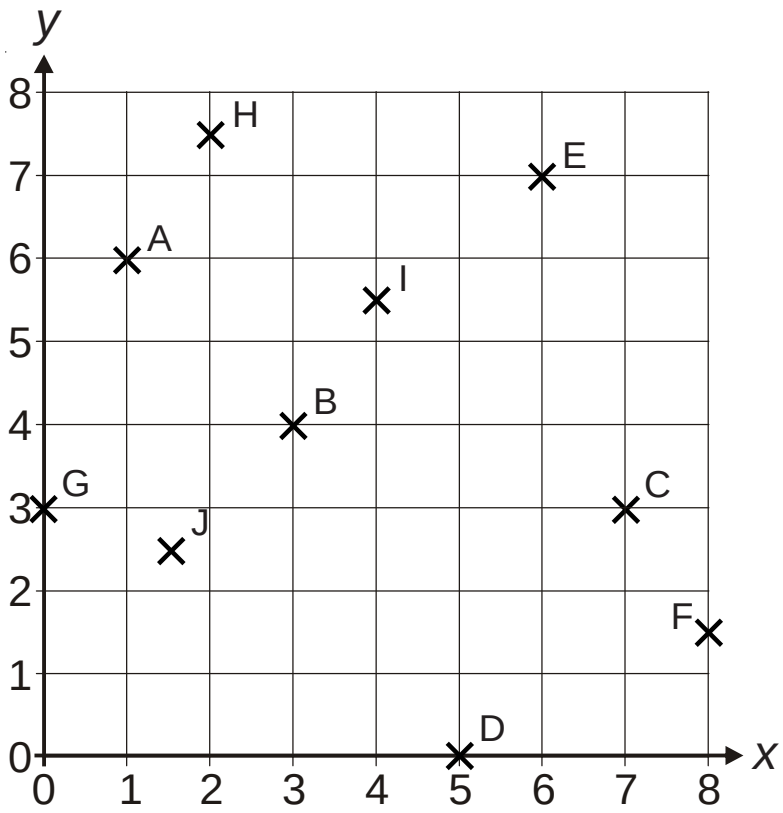
2) You have a 3 pint jug and a 5 pint jug and as much water from a tap as you like.
How can you use the two jugs to measure out **exactly** 4 pints of water?

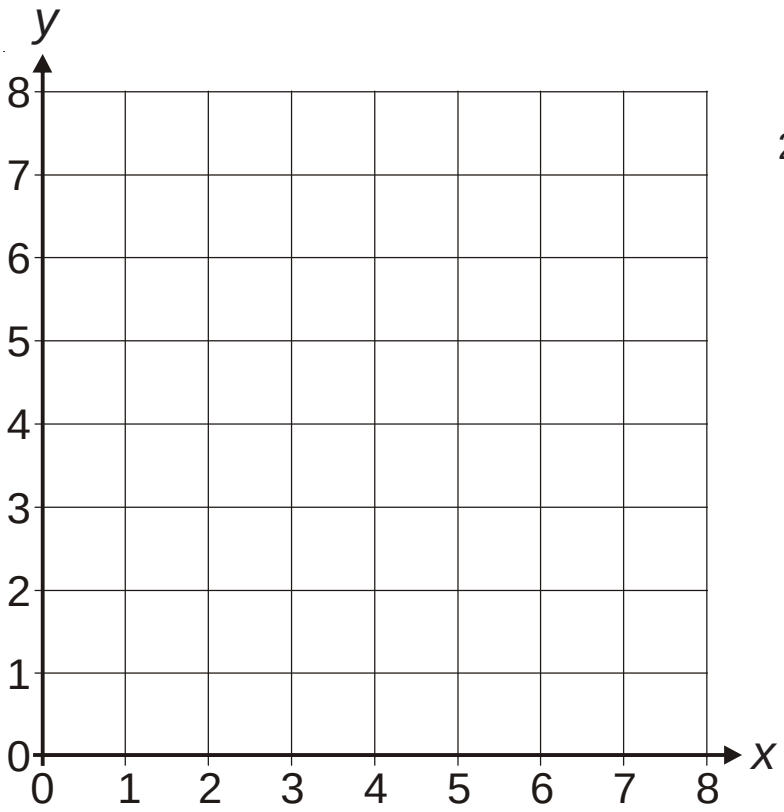
5 Pints

3 Pints

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)

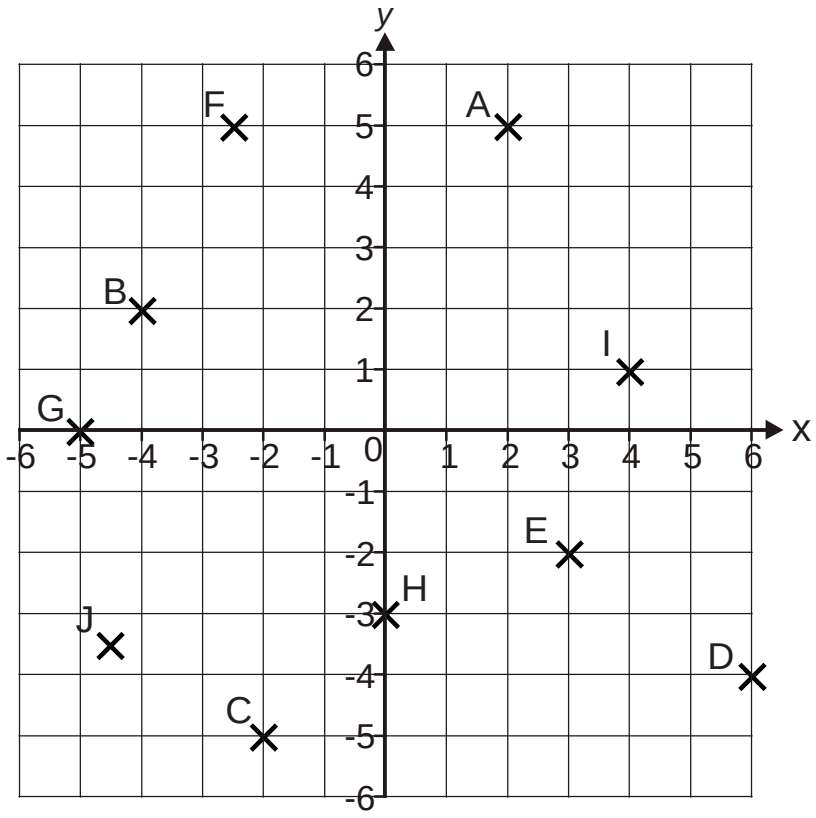
F (0, 6.5)

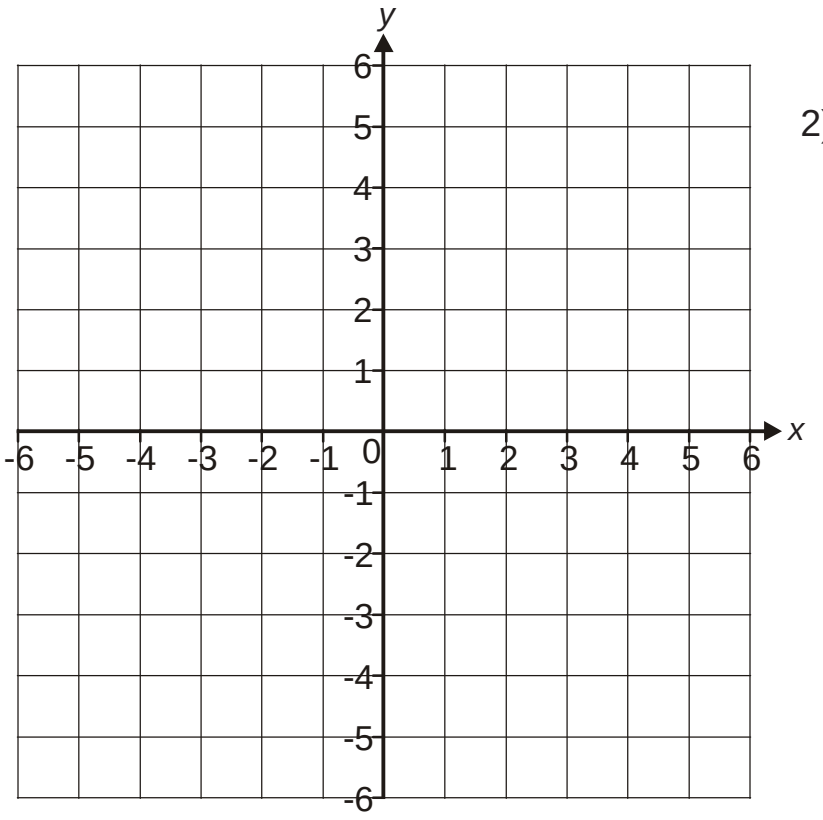
G (5.5, 7.5)

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 _

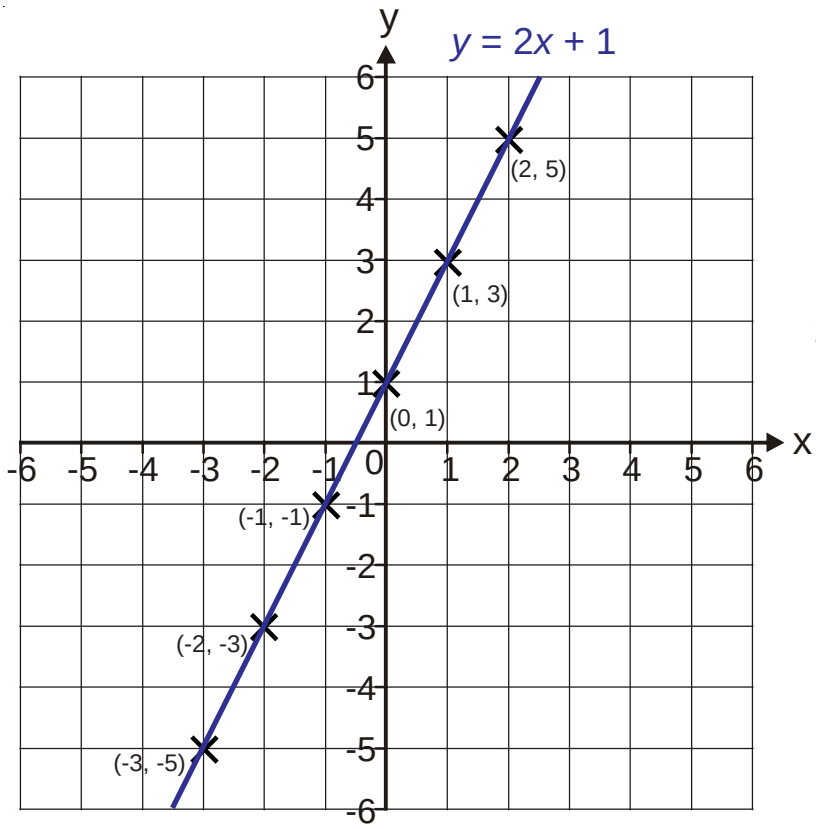
(f)

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)

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

Input → Multiply by 2 → Add 3 → Output

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)

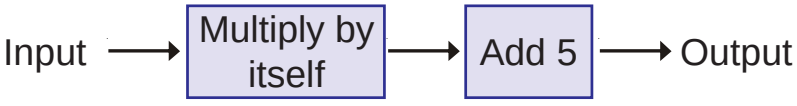
Input	Output
1	__
4	__
10	__
2.5	__
-3	__
__	30
__	48
__	-18
x	$4x - 2$

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

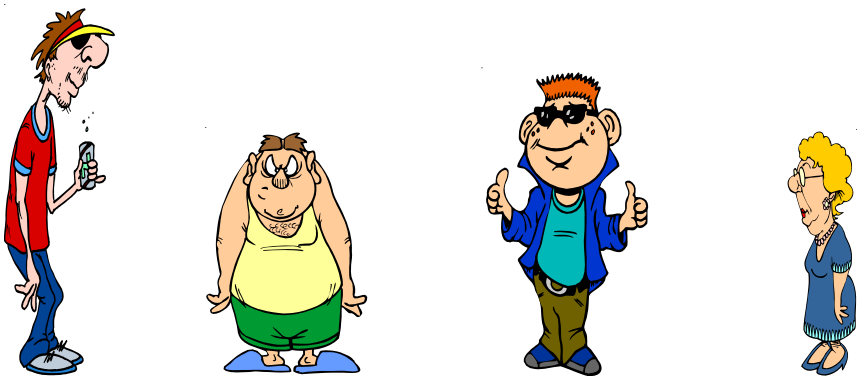
BMI = (weight in kg) ÷ (height in m) ÷ (height in m)

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.

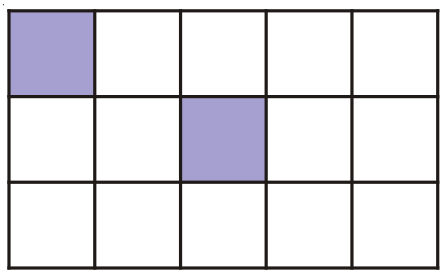
d) A woman is 1.65 m tall and weighs 45.6 kg.
She worries that she is overweight.
Is she right?

R1a

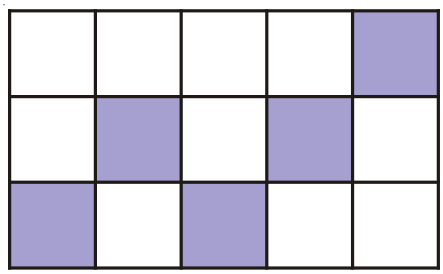
Introduction to Ratio
Real-Life Contexts

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

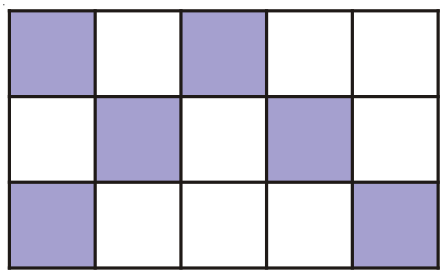
a)



b)



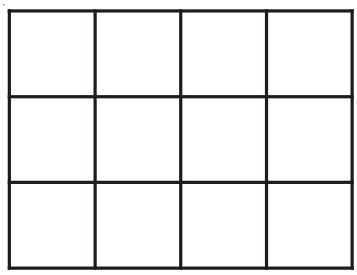
c)



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

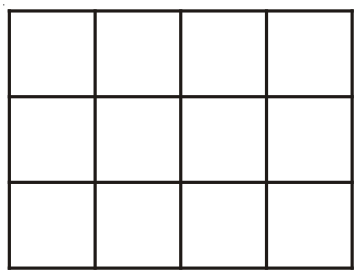
a) Shaded : Unshaded

5 : 7



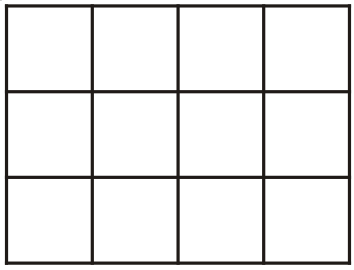
b) Shaded : Unshaded

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.

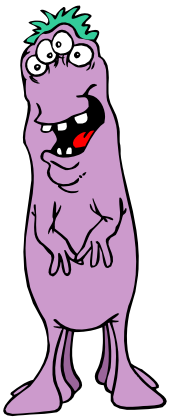
If you count carefully you can see that the ratio of teeth is 5 : 7

a) What is the ratio of feet?

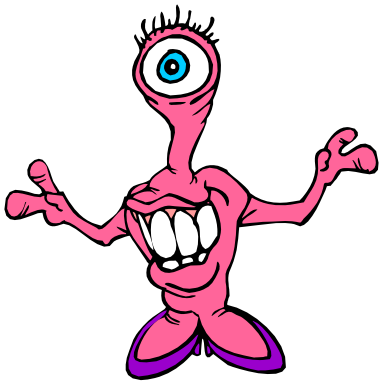
b) What is the ratio of eyes?

c) What is the ratio of fingers?

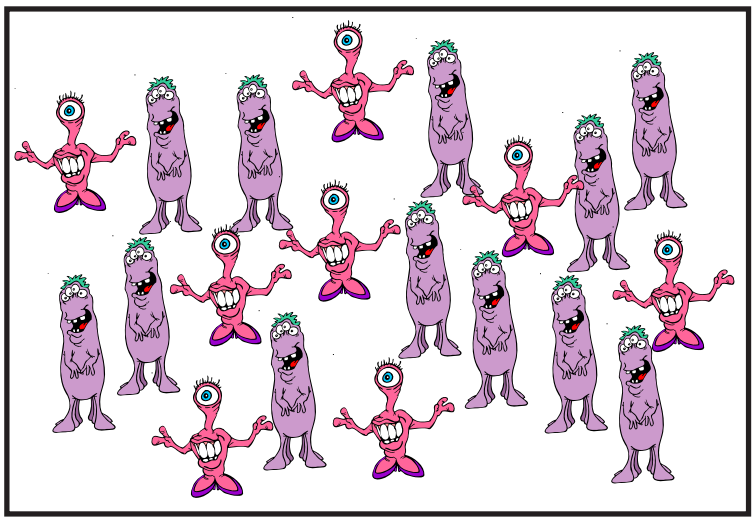
Check that you have given all ratios in the simplest form.



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.

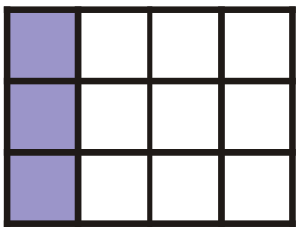
R1b

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.

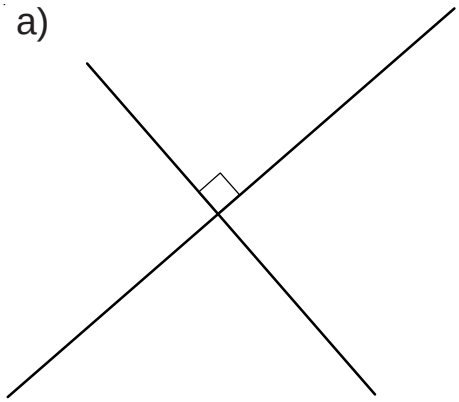
e) How many mm are in 5 m?

f) Convert 9600 mm to m.

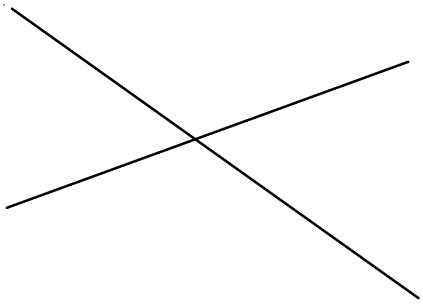
G1 Basic Geometric Definitions

1) Which of these diagrams show perpendicular lines?

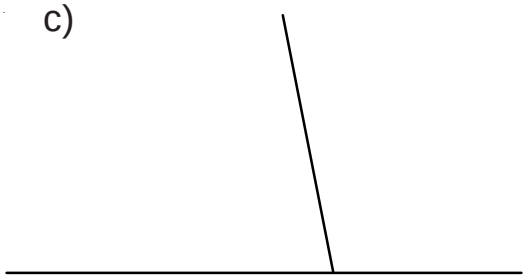
a)



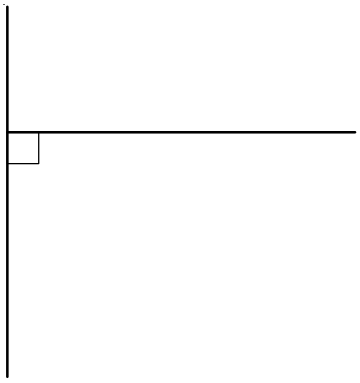
b)



c)



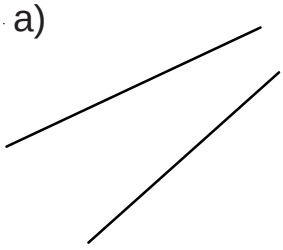
d)



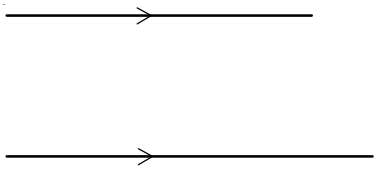
2) Perpendicular lines meet at what angle?

3) Which of these diagrams show parallel lines?

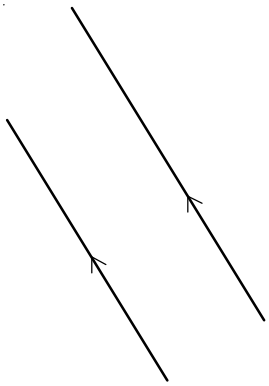
a)



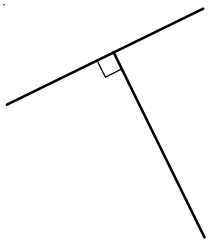
b)



c)



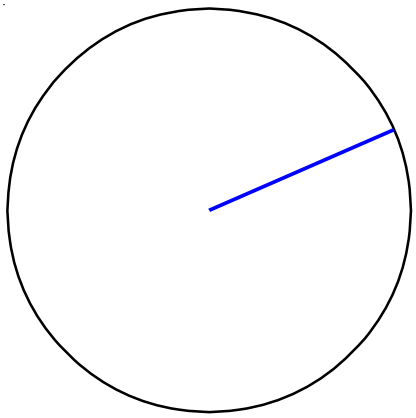
d)



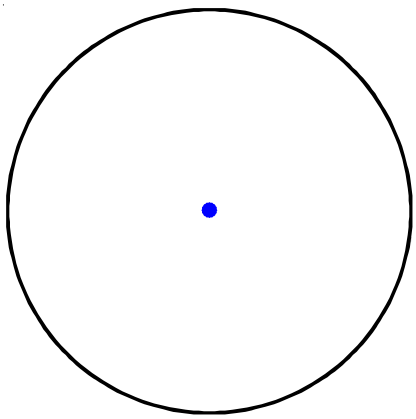
G2 Properties of Circles

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

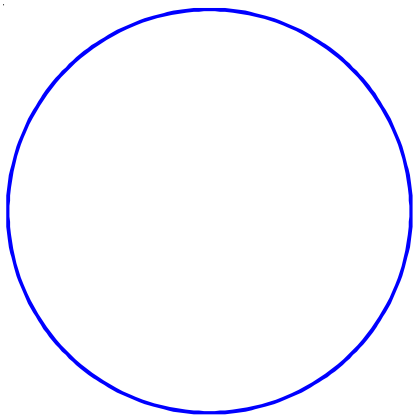
a)



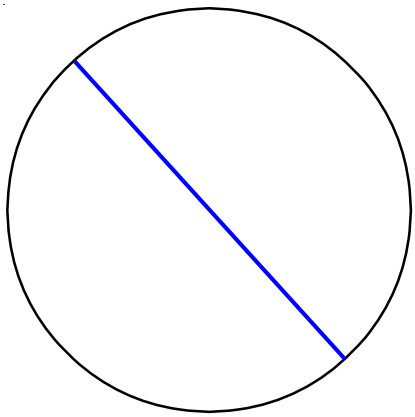
b)



c)

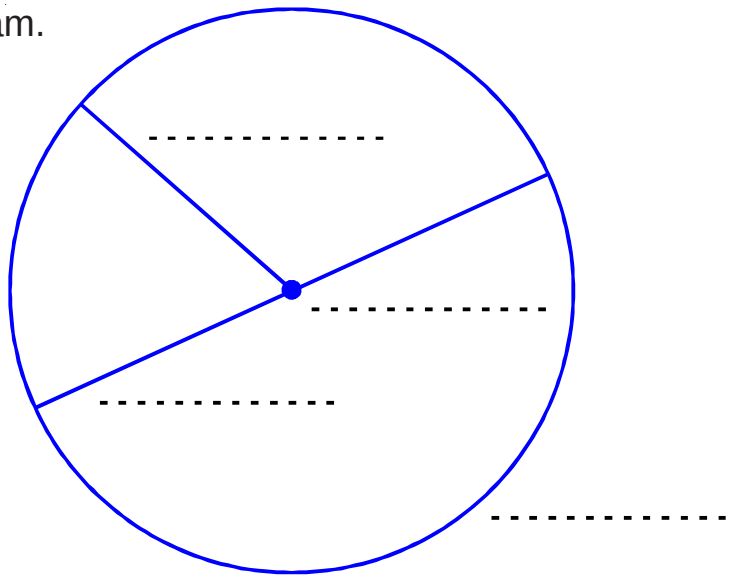


d)



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

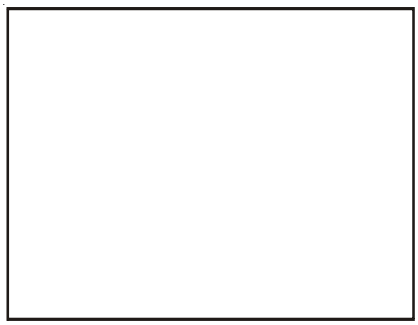
3) Label this diagram.



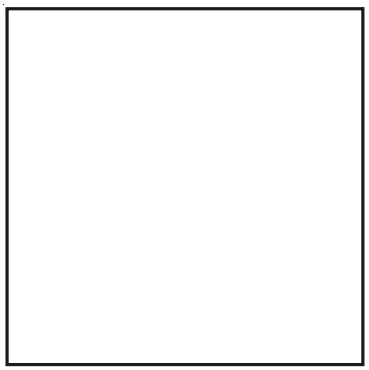
G3 Line Symmetry

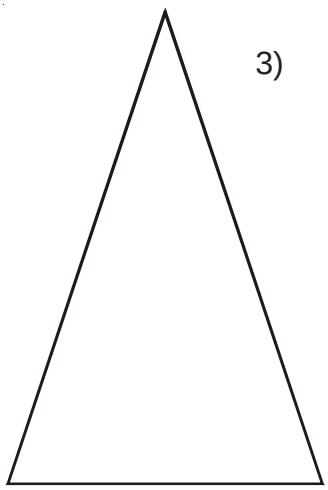
Look at each shape, read the description and then draw in all the lines of symmetry.

1) **Rectangle**
Two lines of symmetry

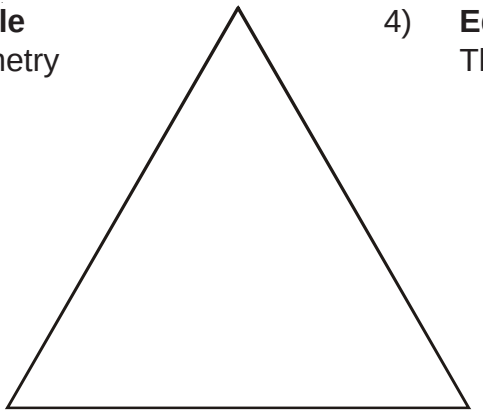


2) **Square**
Four lines of symmetry



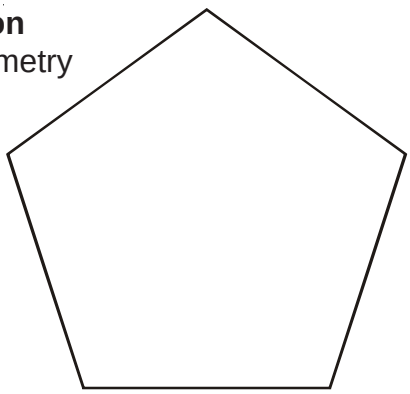


3) **Isosceles triangle**
One line of symmetry

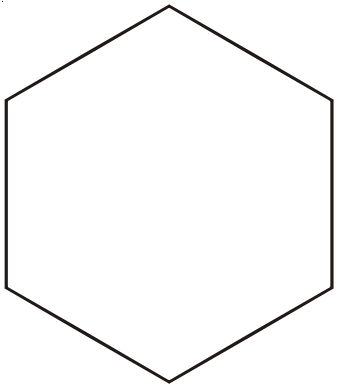


4) **Equilateral triangle**
Three lines of symmetry

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

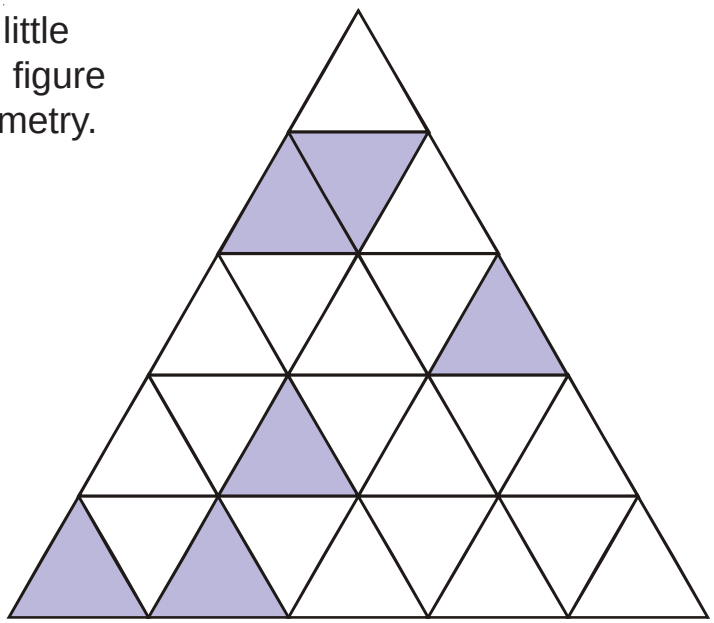


6) **Regular hexagon**
Six lines of symmetry

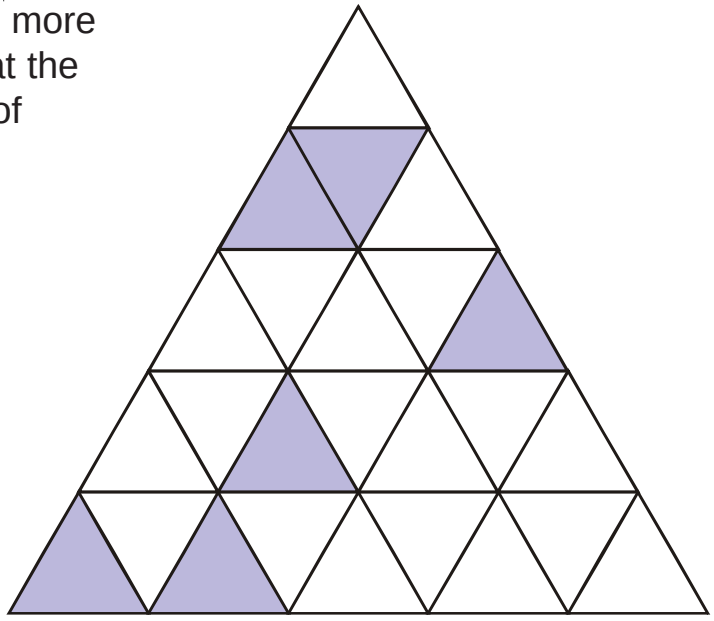


G3 Line Symmetry

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



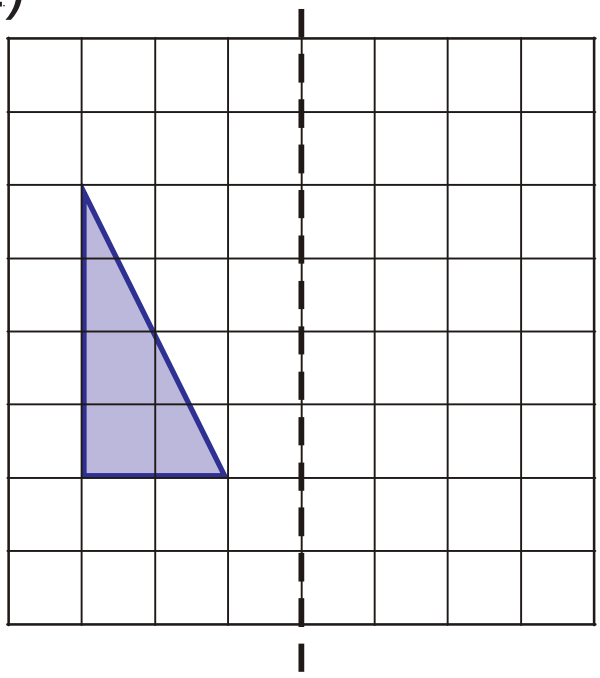
2) Shade in **just three** more little triangles so that the figure has one line of symmetry.



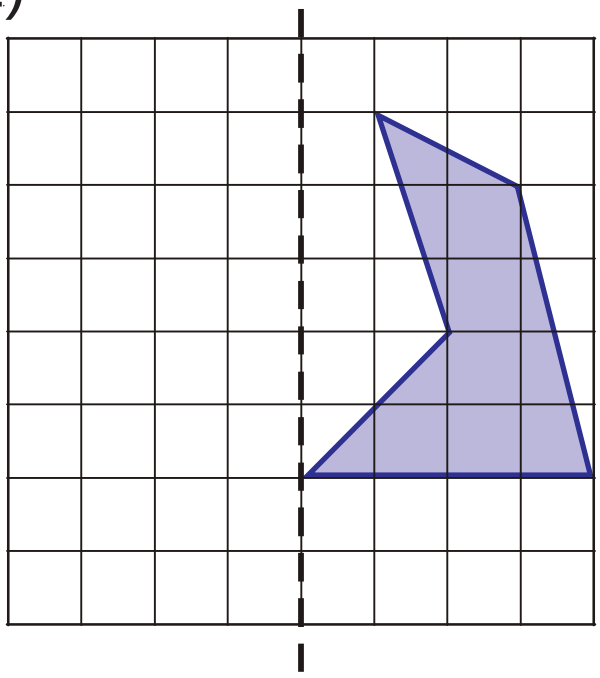
G4a Reflection
Horizontal and Vertical Mirror Lines

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

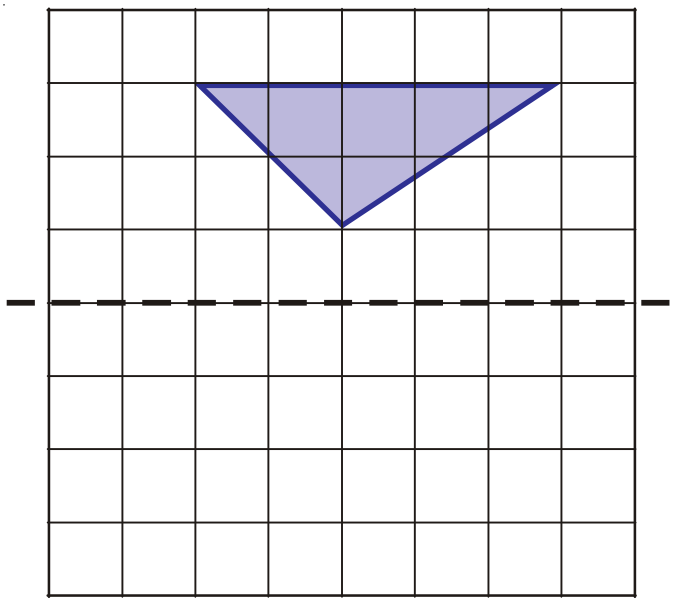
1)



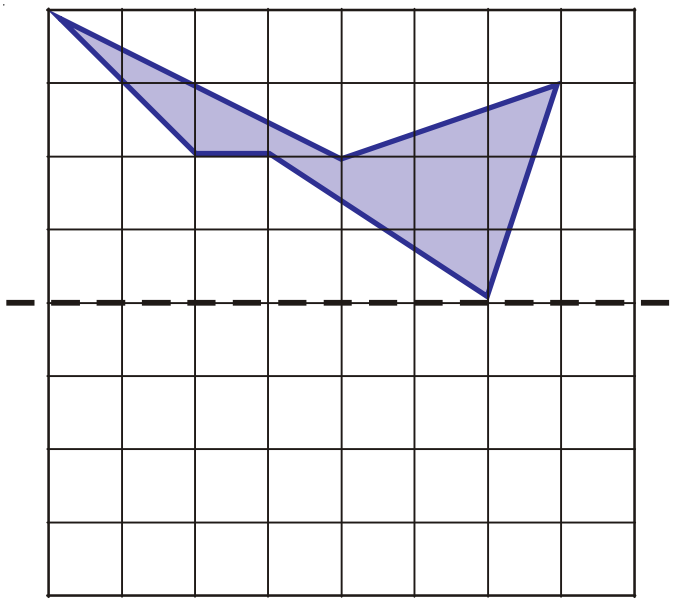
2)



3)

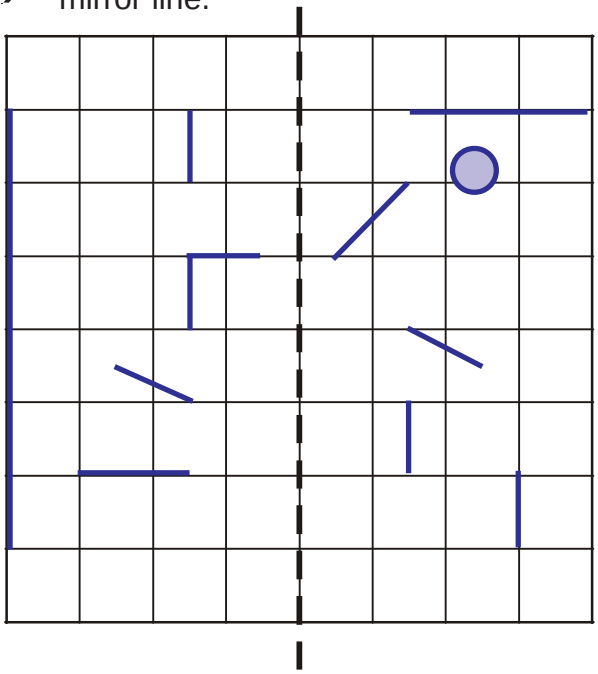


4)

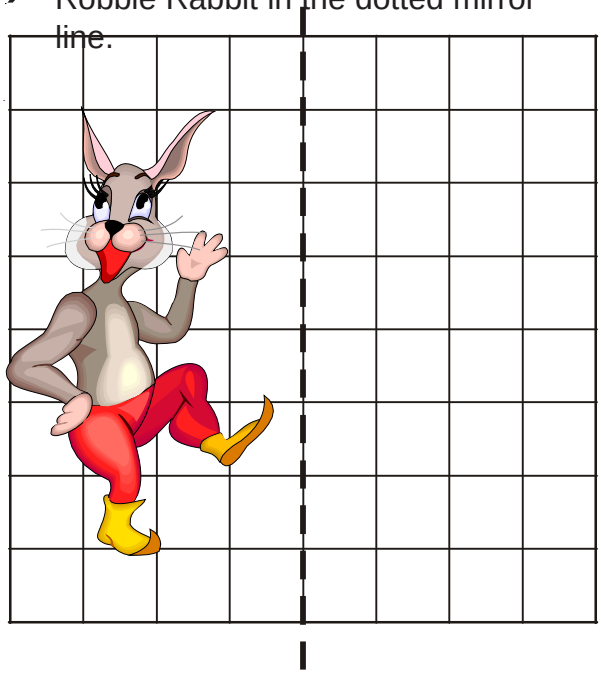


G4a Reflection
Horizontal and Vertical Mirror Lines

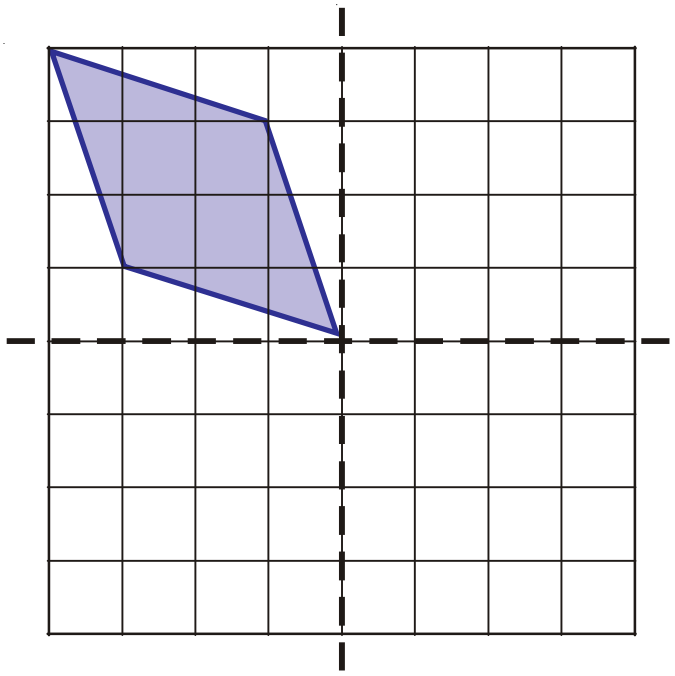
1) Reflect every line in the dotted mirror line.



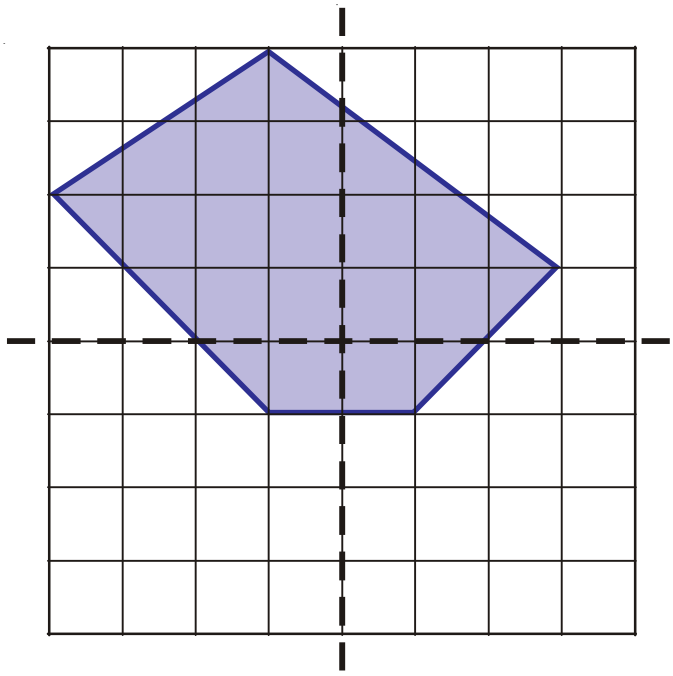
2) Use the grid to help you reflect Robbie Rabbit in the dotted mirror line.



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.

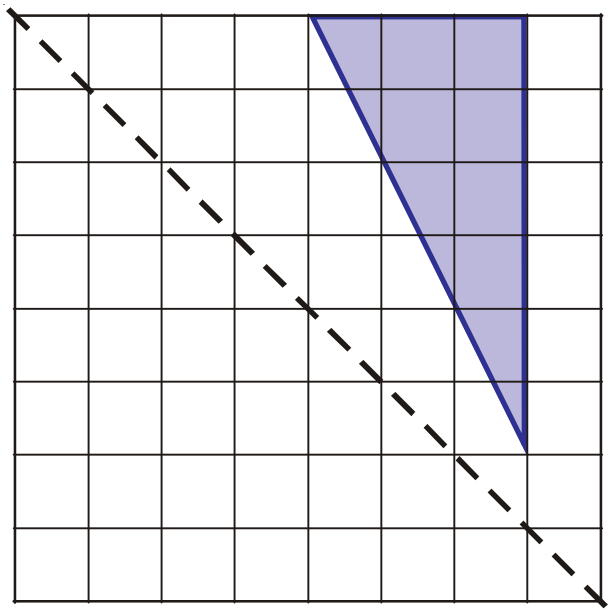


G4b

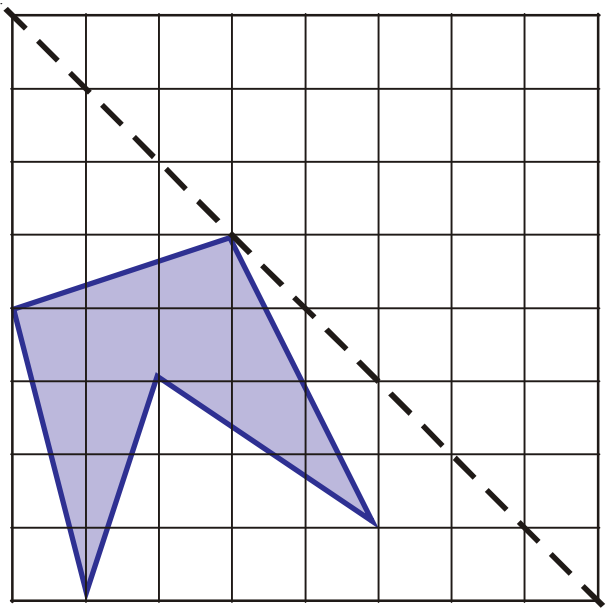
Reflection
Diagonal Mirror Lines

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

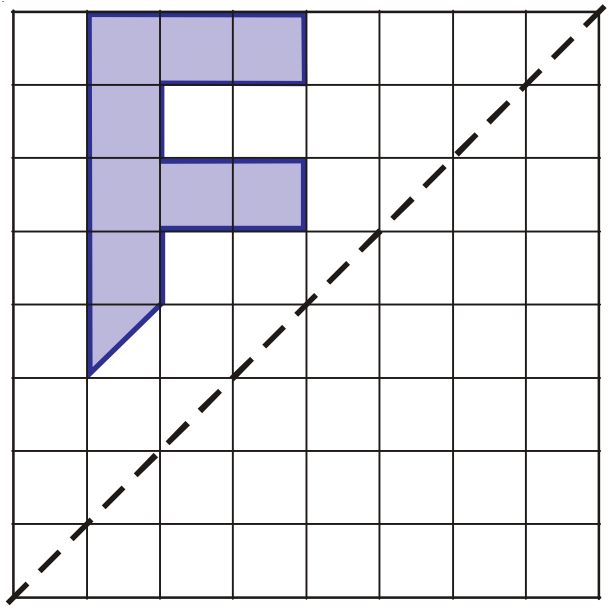
1)



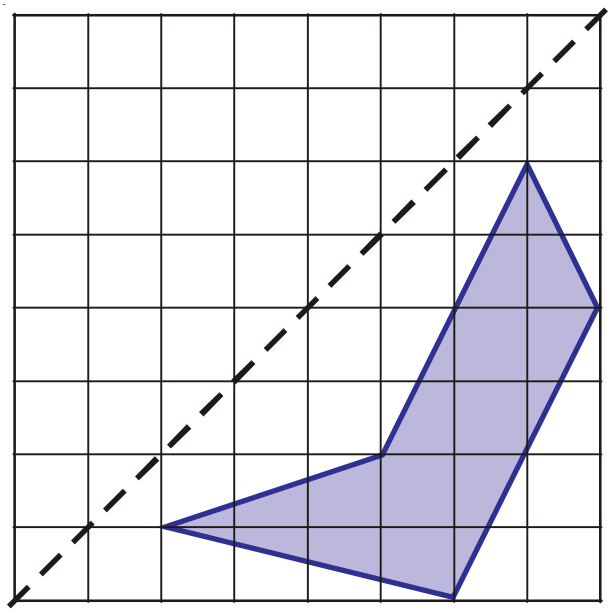
2)



3)

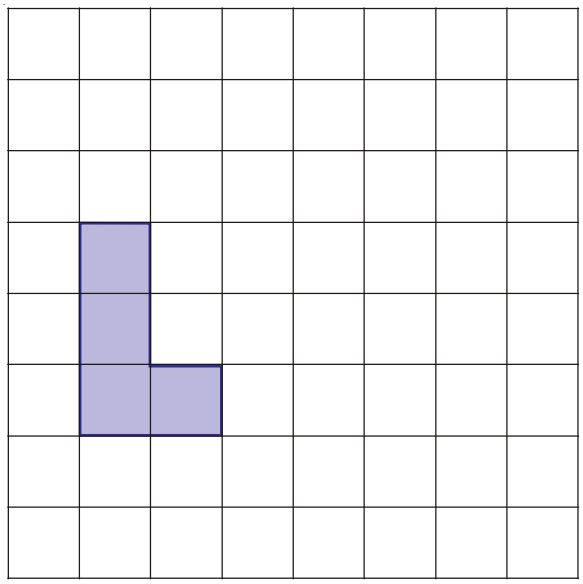


4)

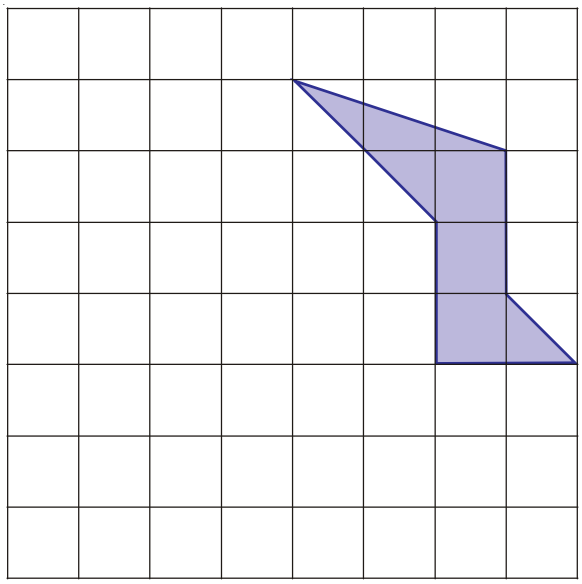


G5 Translation

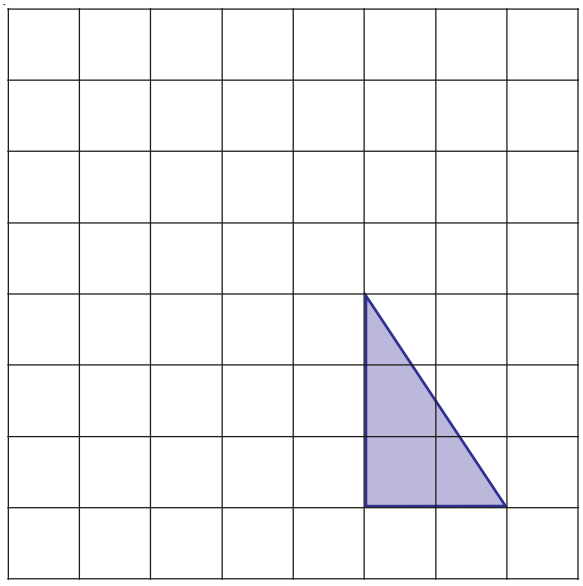
1) Translate the shape 5 squares to the right and 2 squares up.



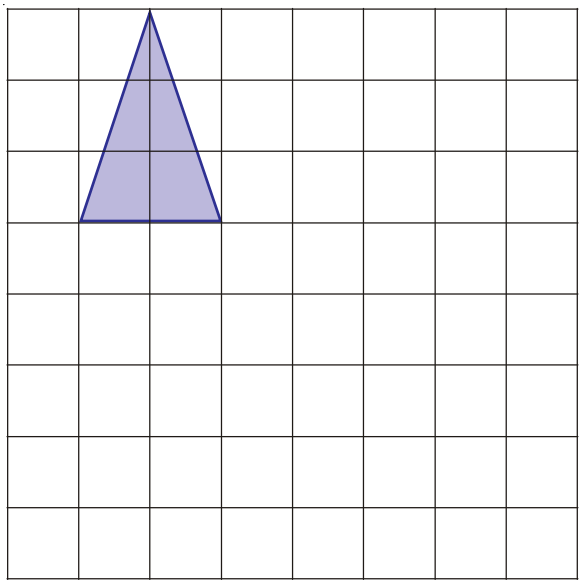
2) Translate the shape 3 squares to the left and 2 squares down.



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 $\begin{pmatrix} 2 \\ 0 \end{pmatrix}$

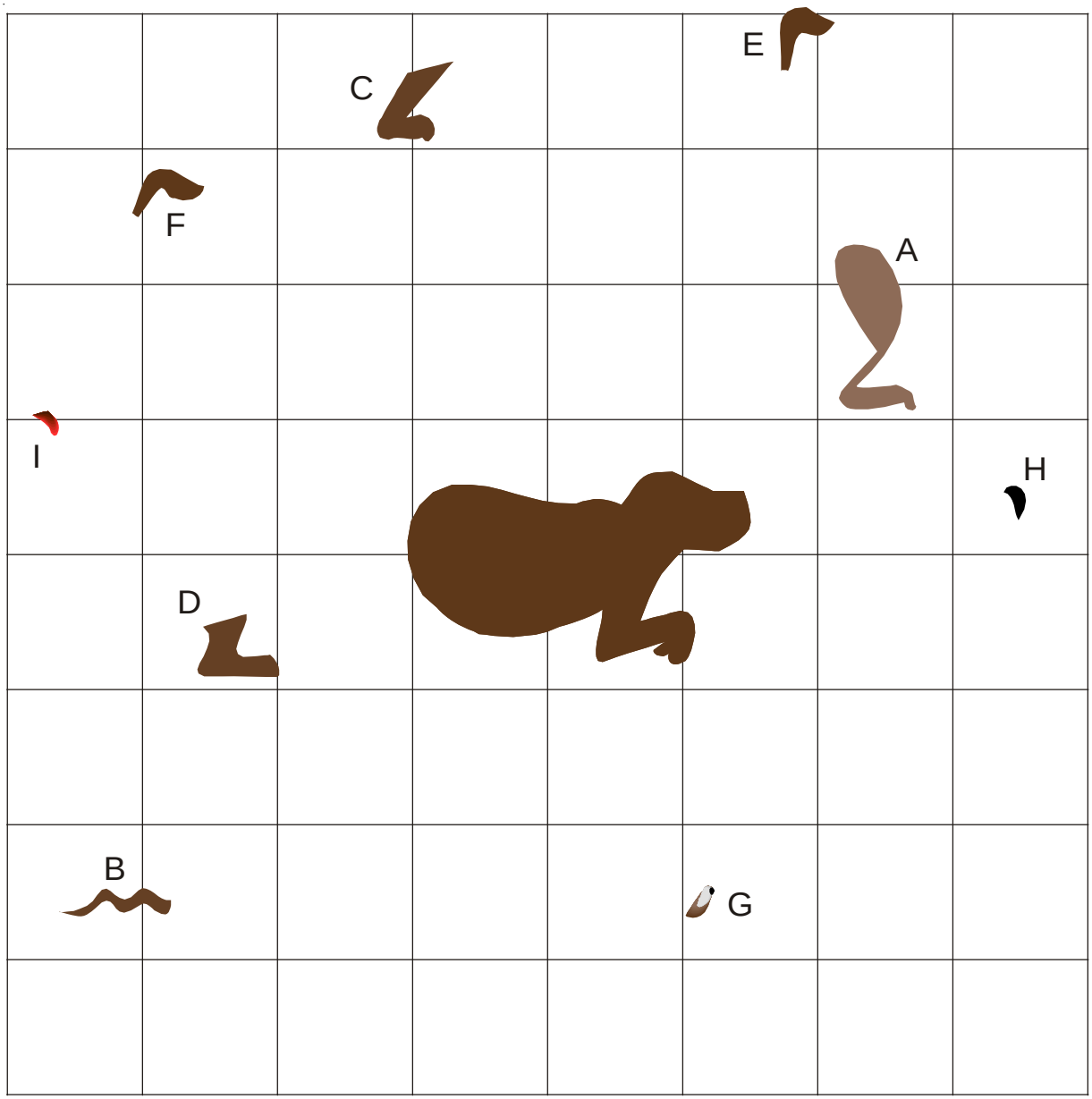
E with vector $\begin{pmatrix} -1 \\ -3 \end{pmatrix}$

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

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

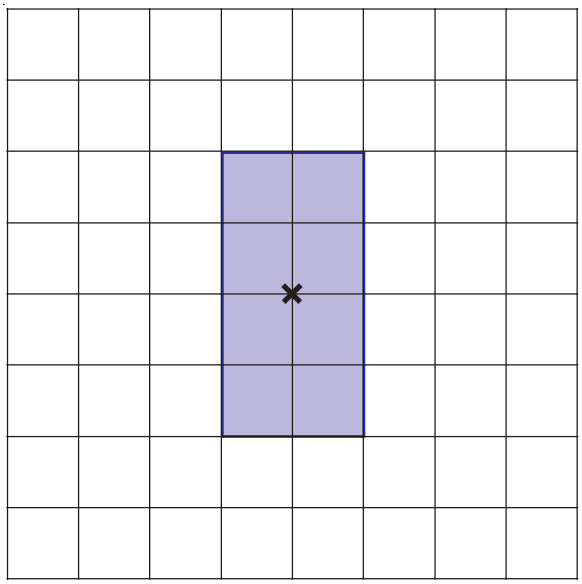
H with vector $\begin{pmatrix} -2 \\ 0 \end{pmatrix}$

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

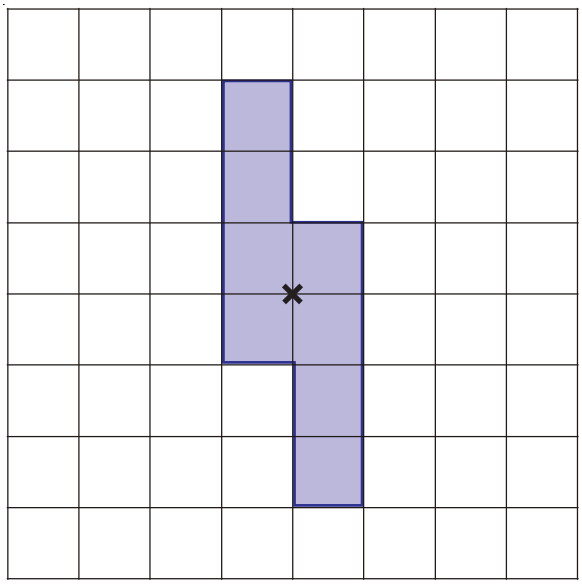


G6 Rotation

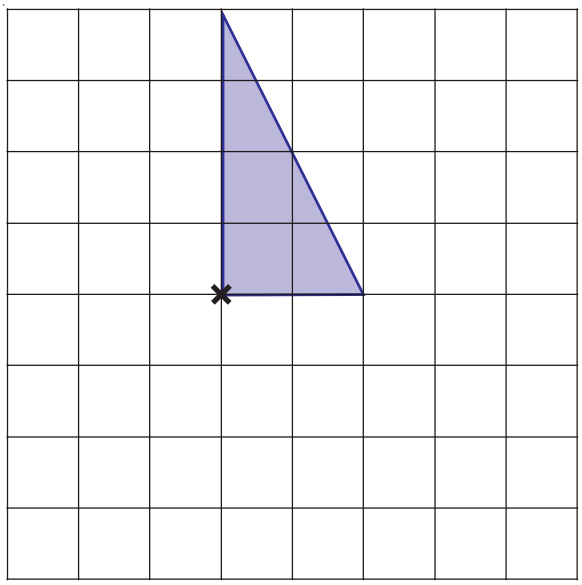
1) Rotate the shape 90° about the cross.



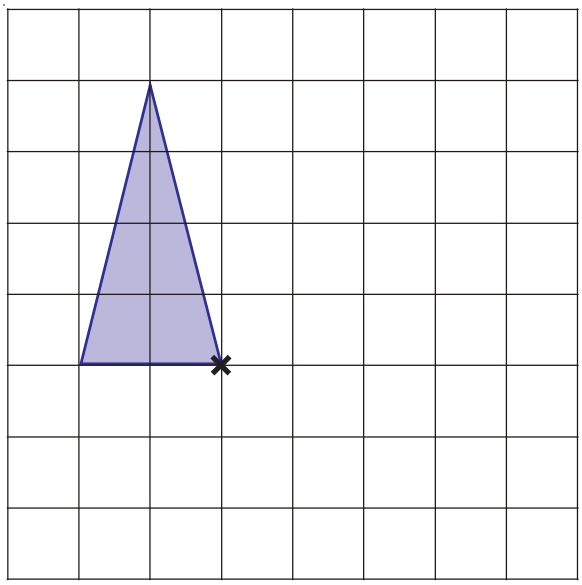
2) Rotate the shape 90° about the cross.



3) Rotate the shape 180° about the cross.



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



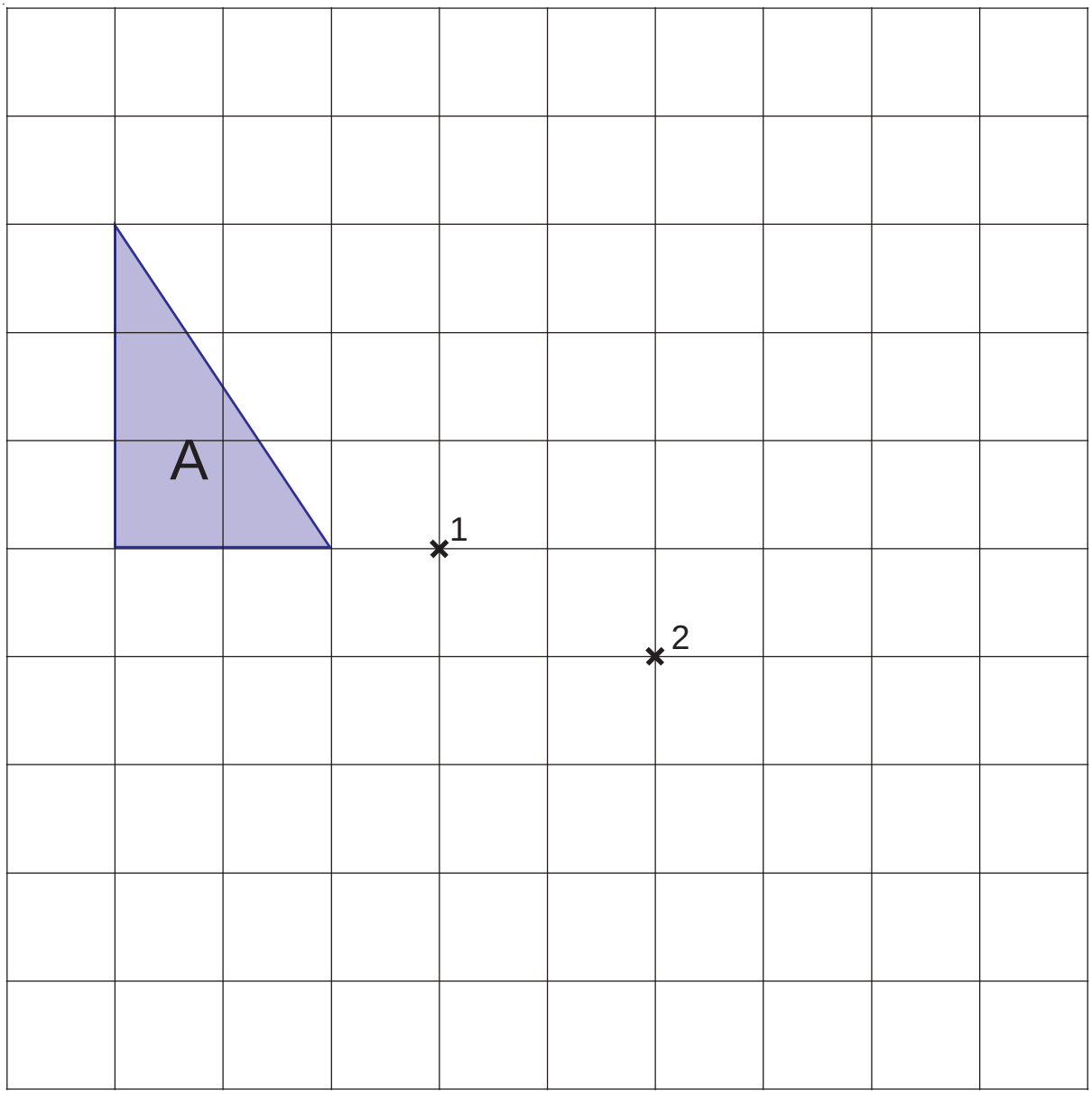
G6 Rotation

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.



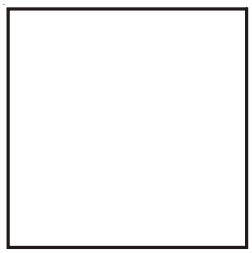
G7 Rotational Symmetry

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

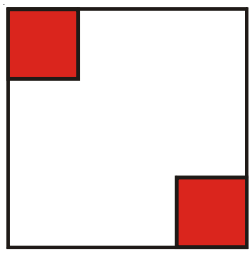
i) The order of rotational symmetry.

ii) How many lines of symmetry it has.

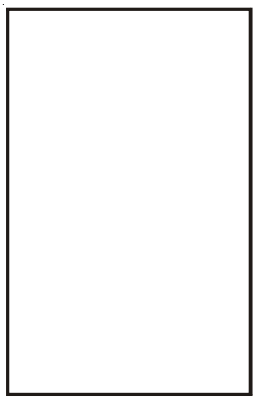
a)



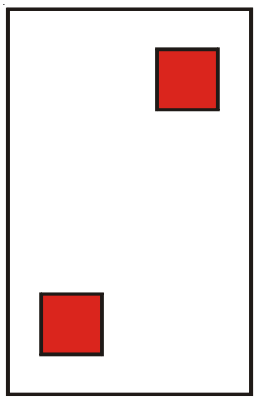
b)



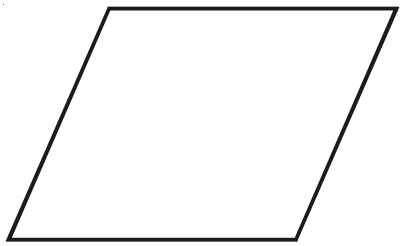
c)



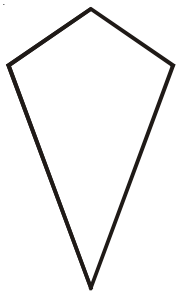
d)



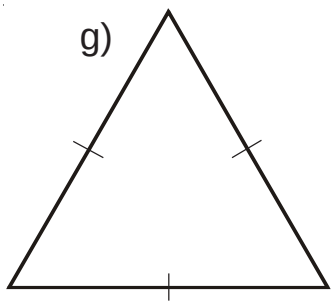
e)



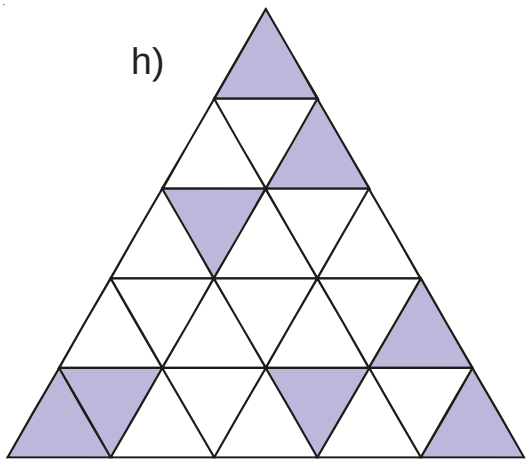
f)



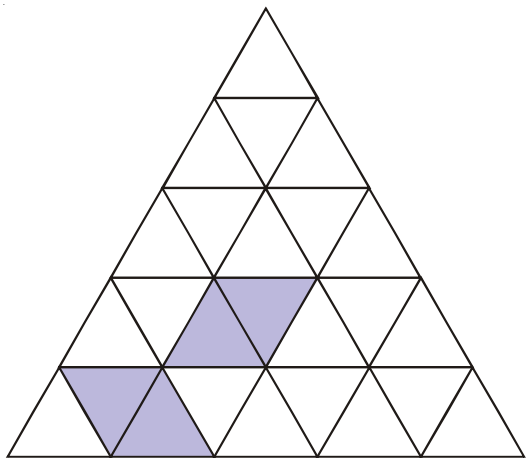
g)



h)

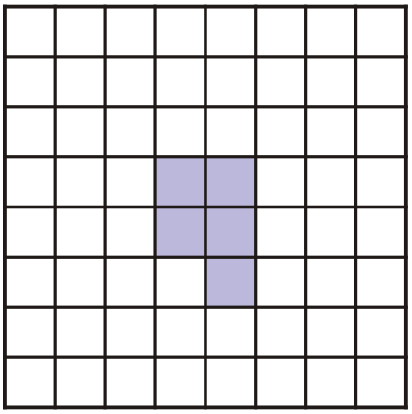


2) Shade in six more triangles so that this figure has rotational symmetry order 3

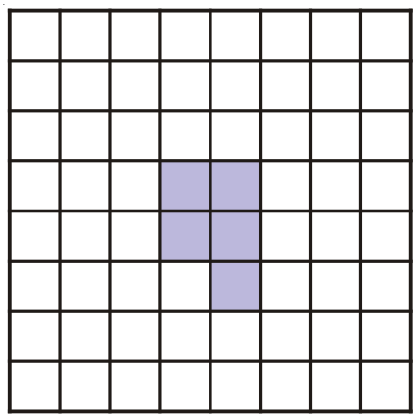


G7 Rotational Symmetry

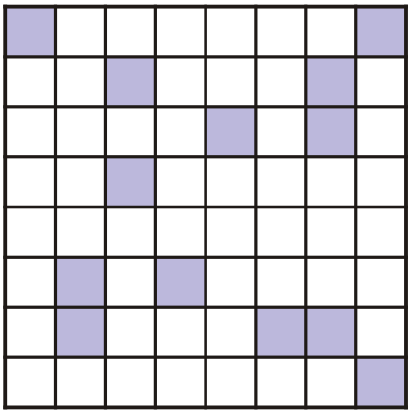
1) a) Shade in one square so that this shape has rotational symmetry of order 2.



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.



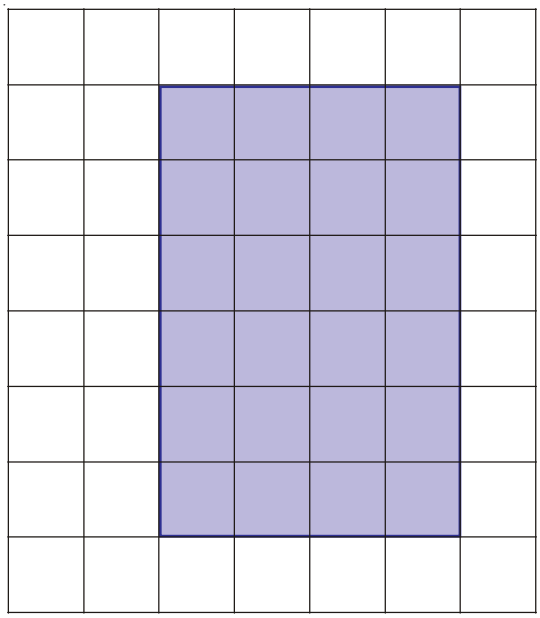
3) The diagram shows a poster which Chloe has on her wall.
When Chloe was standing on her head, looking in a mirror on the opposite wall at the poster on the wall behind her, how many letters could still be read the normal way?

CHLOE
BAXTER

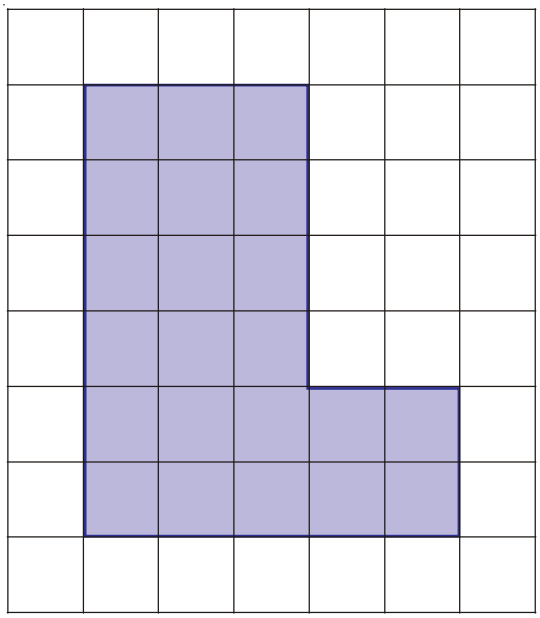
G8a

Perimeters
Counting Squares

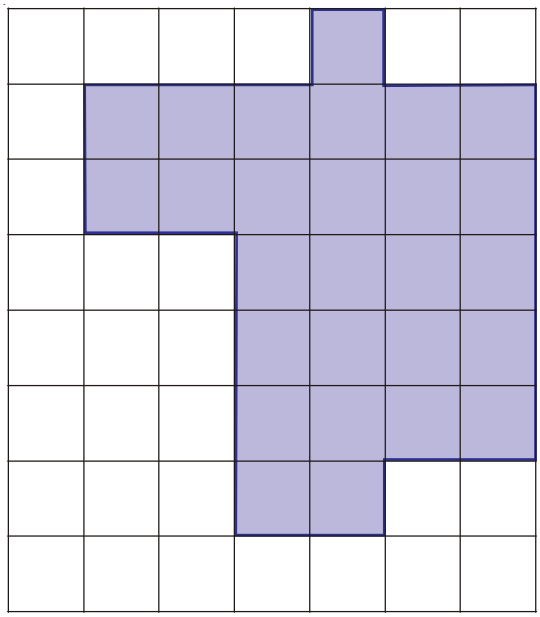
1) Find the perimeter of this rectangle on the cm grid.



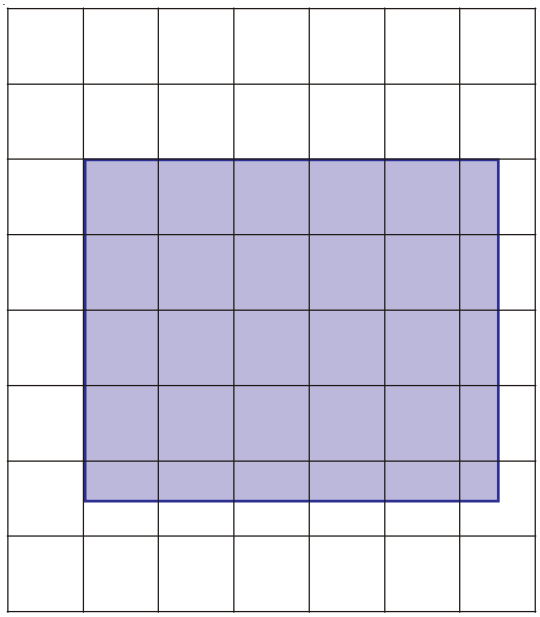
2) Find the perimeter of this shape on the cm grid.



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



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



G8a

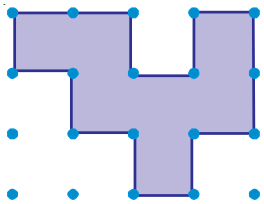
Perimeters
Counting Squares

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



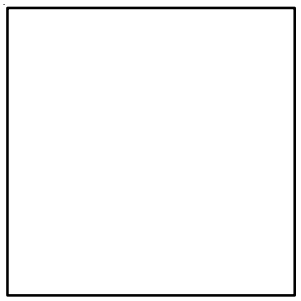
G8b

Perimeters
Using a Formula

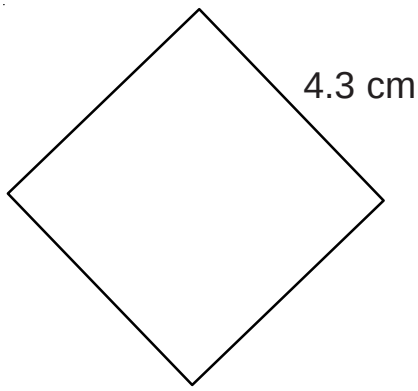
1) a) What is the formula for the perimeter of a square?

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

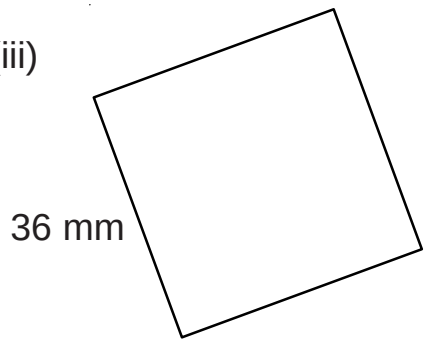
(i)



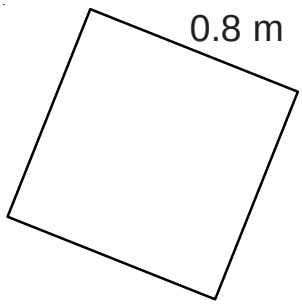
(ii)



(iii)



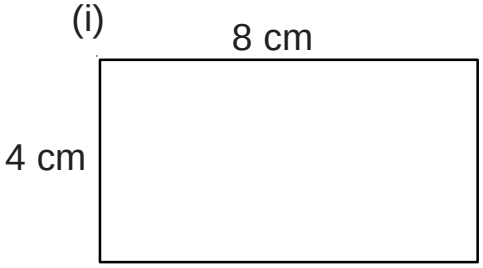
(iv)



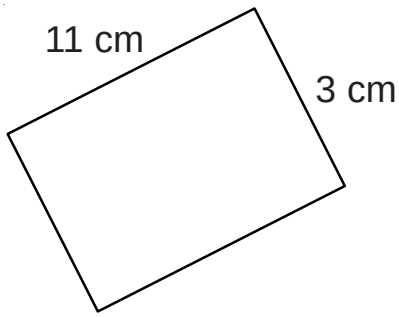
2) a) What is the formula for the perimeter of a rectangle?

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

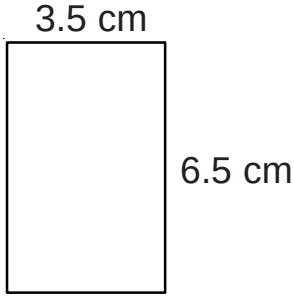
(i)



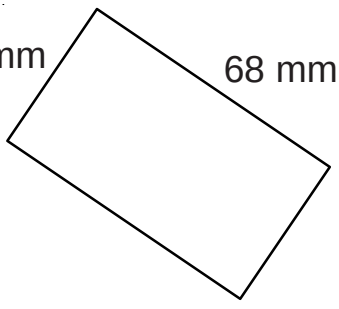
(ii)



(iii)



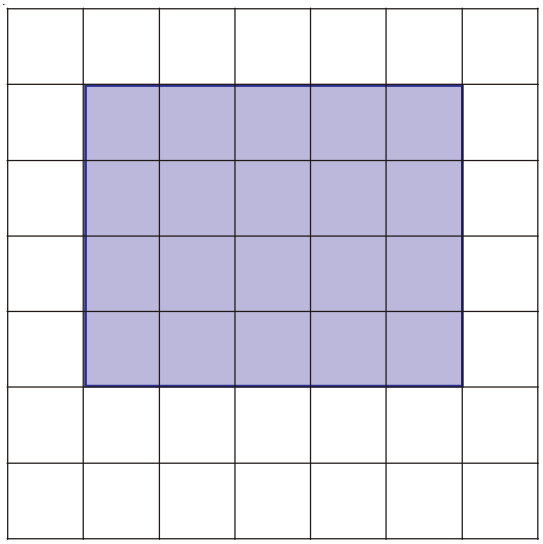
(iv)



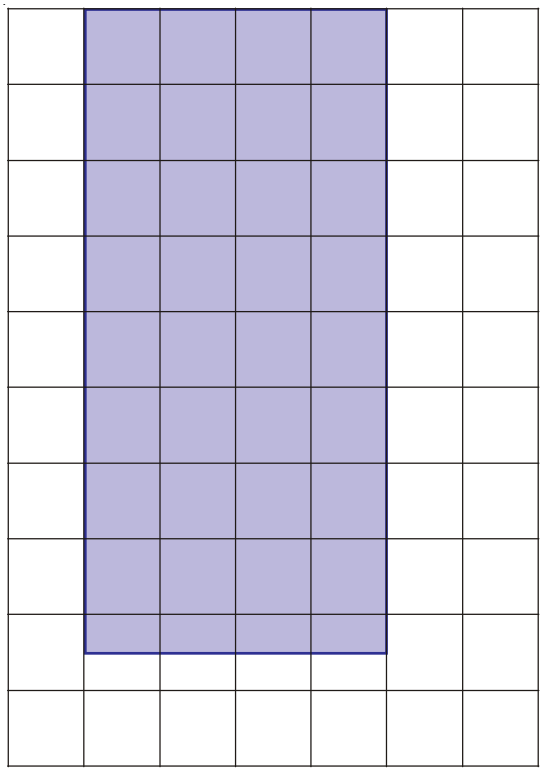
G9

Areas
Counting Squares

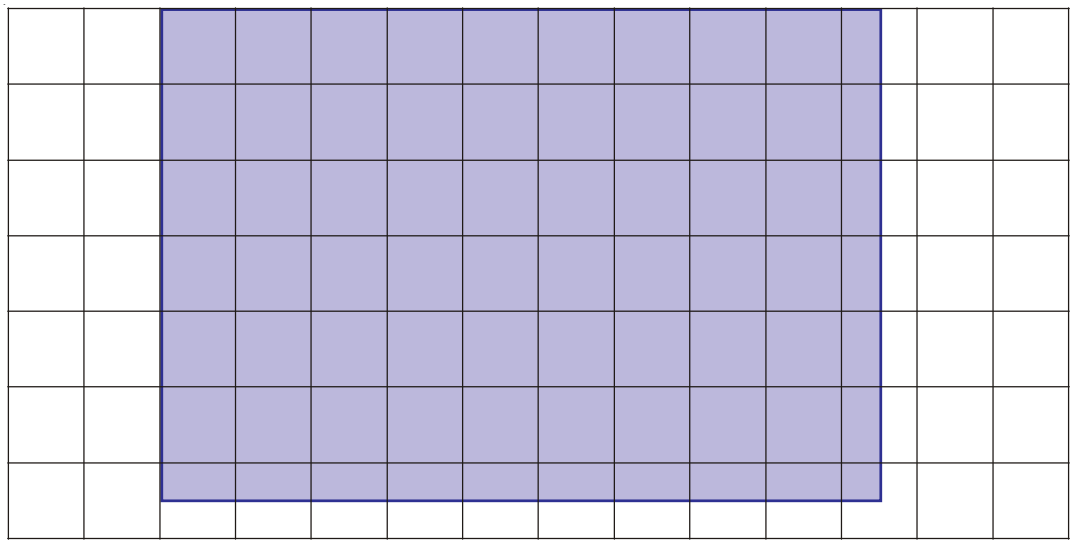
1) Find the area of the rectangle on this centimetre grid.



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



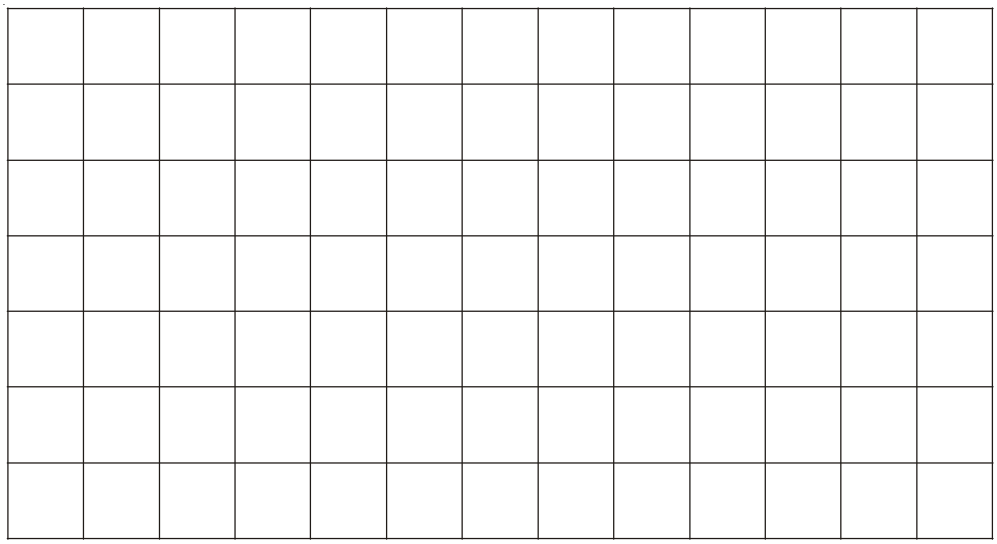
3) Find the area of the rectangle on this centimetre grid.



G9

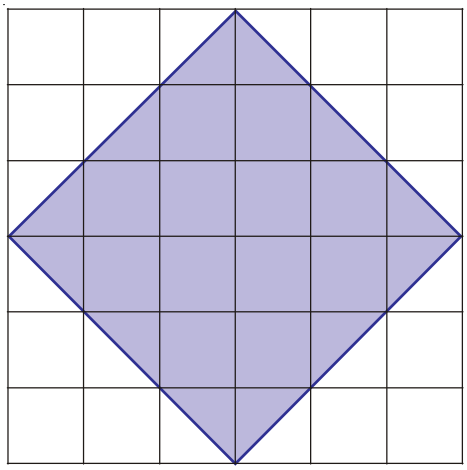
Areas
Counting Squares

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

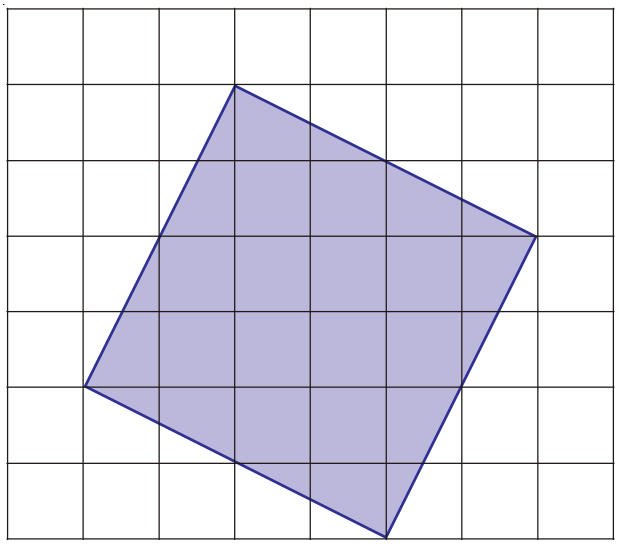


This is a difficult question

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



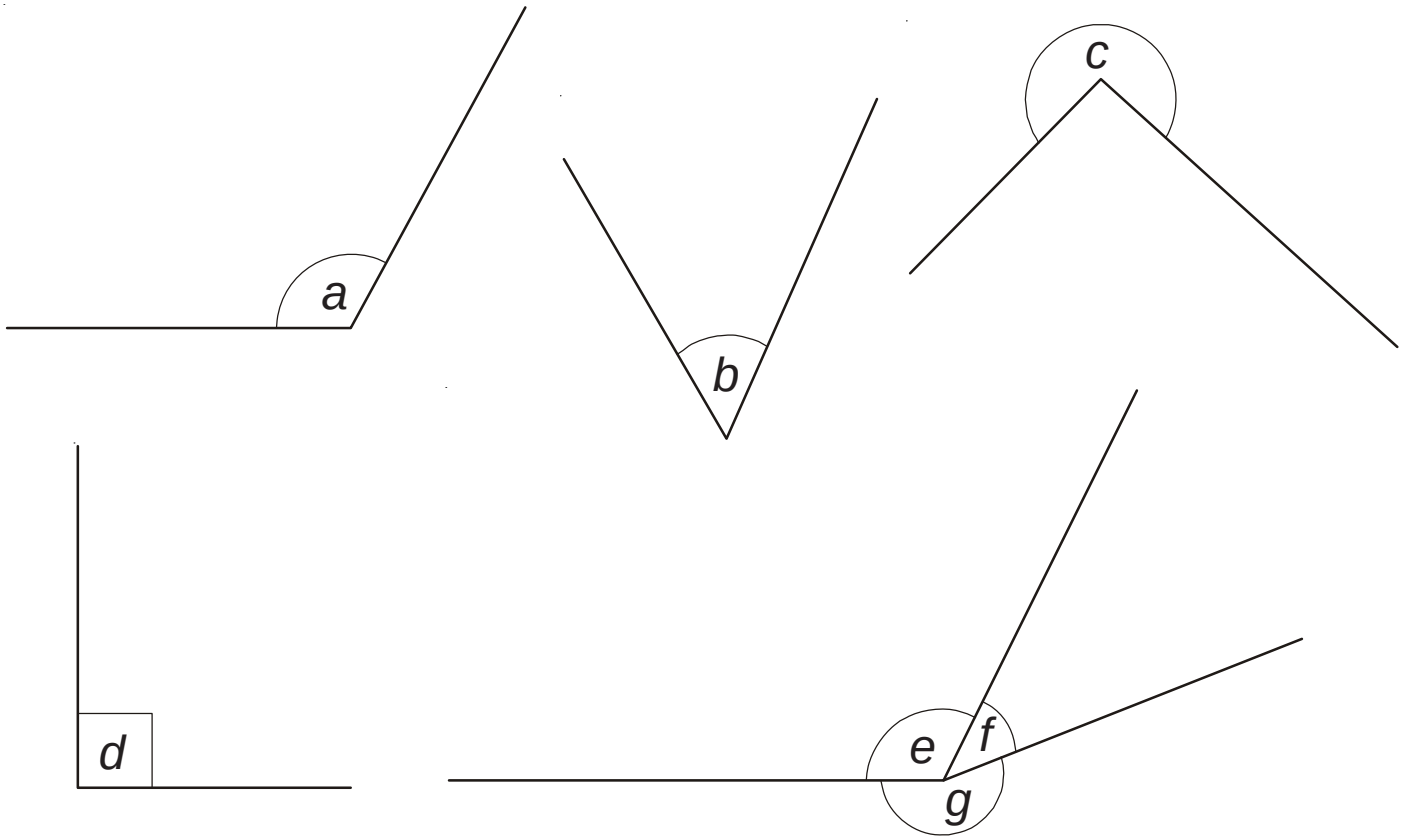
3) Find the area of the square on this centimetre grid.



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.

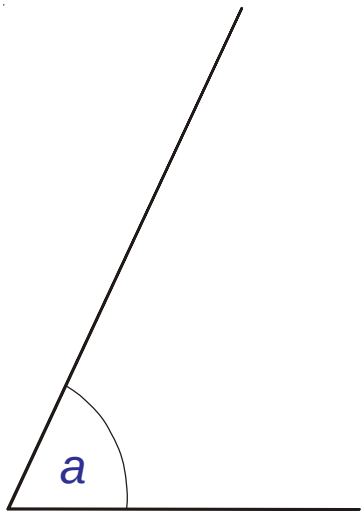
c) Draw a quadrilateral (4-sided shape) which has one reflex angle and three acute angles.

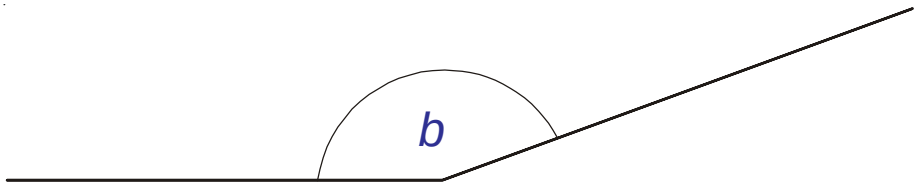
d) Draw a quadrilateral which has one right angle, one acute angle and two obtuse angles.

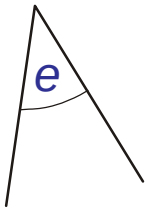
e) Draw a quadrilateral which has two obtuse angles and two acute angles.

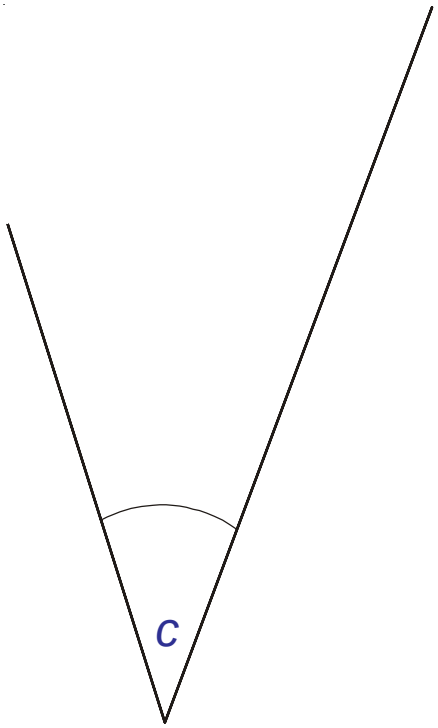
G10b Measuring Angles

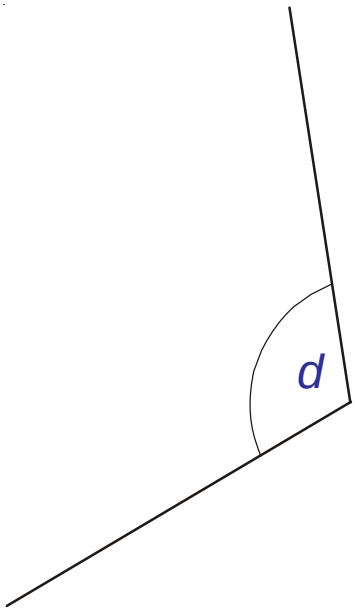
Use a protractor to measure the angles below.





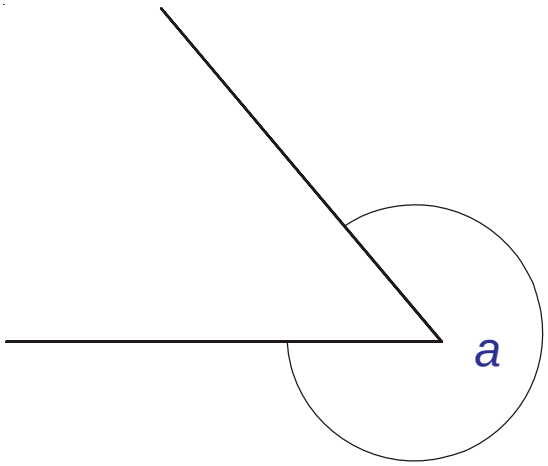


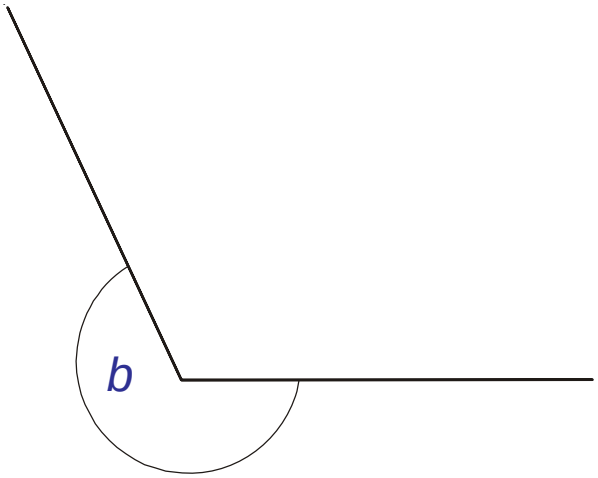


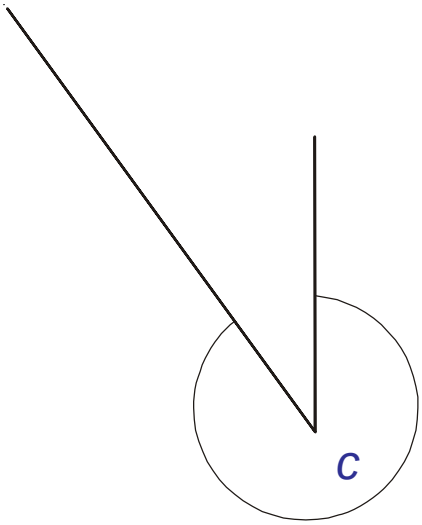


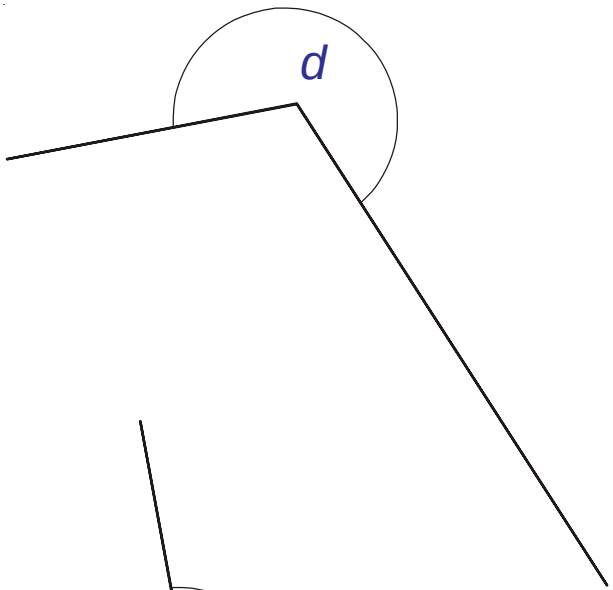
G10b Measuring Angles

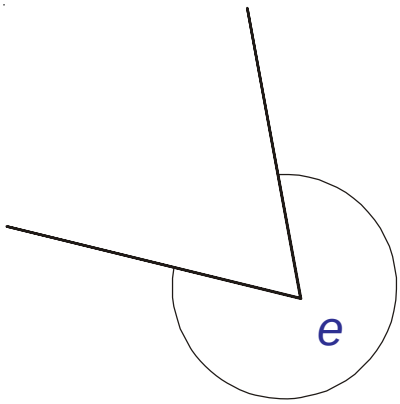
Use a protractor to measure the angles below.







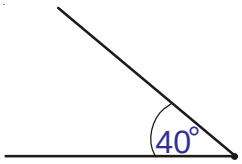




G10c Drawing Angles

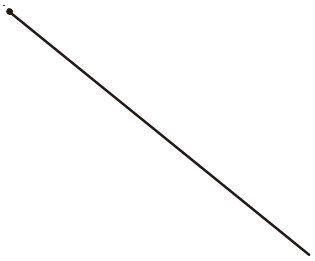
Draw the angle where you see the dot.
Here is an example:

40°



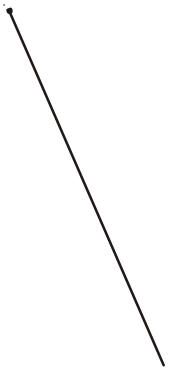
a) 70°

b) 135°



c) 28°

d) 171°



G10c Drawing Angles

Draw the angle where you see the dot.

a) 340°

b) 305°

c) 245°

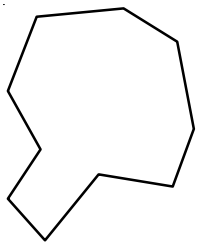
d) 193°

G11 Polygons

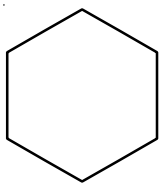
1) How many sides does a pentagon have?

2) Give the two names for a 7-sided polygon _____ and _____

3) Match the shapes to the names

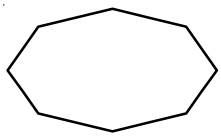


Regular hexagon

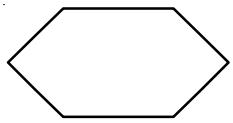


Irregular pentagon

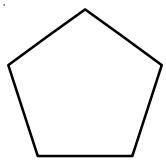
Regular pentagon



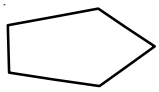
Octagon



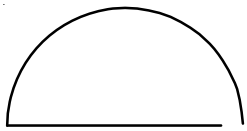
Irregular hexagon



Decagon

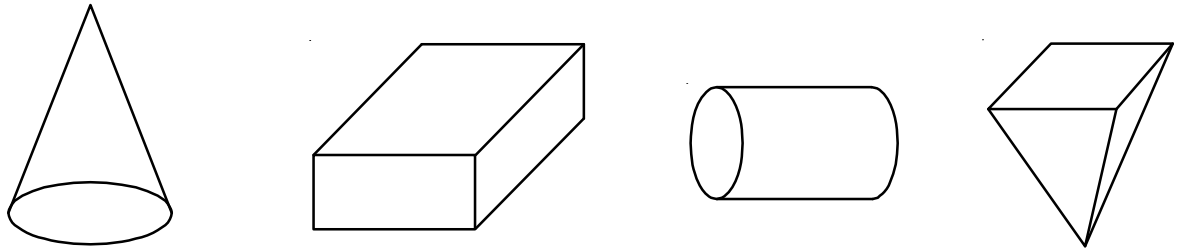


4) Give two reasons why this diagram does not show a polygon.

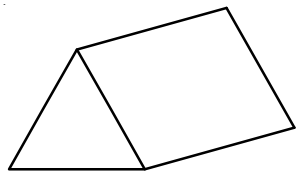


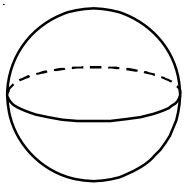
G12a 3D Shapes - Properties

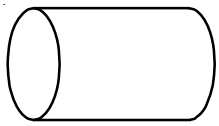
1) Which of these shapes are prisms? Tick them.

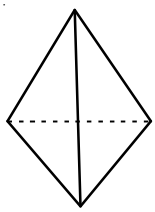


2) Write the names of these shapes.

a) 

b) 

c) 

d) 

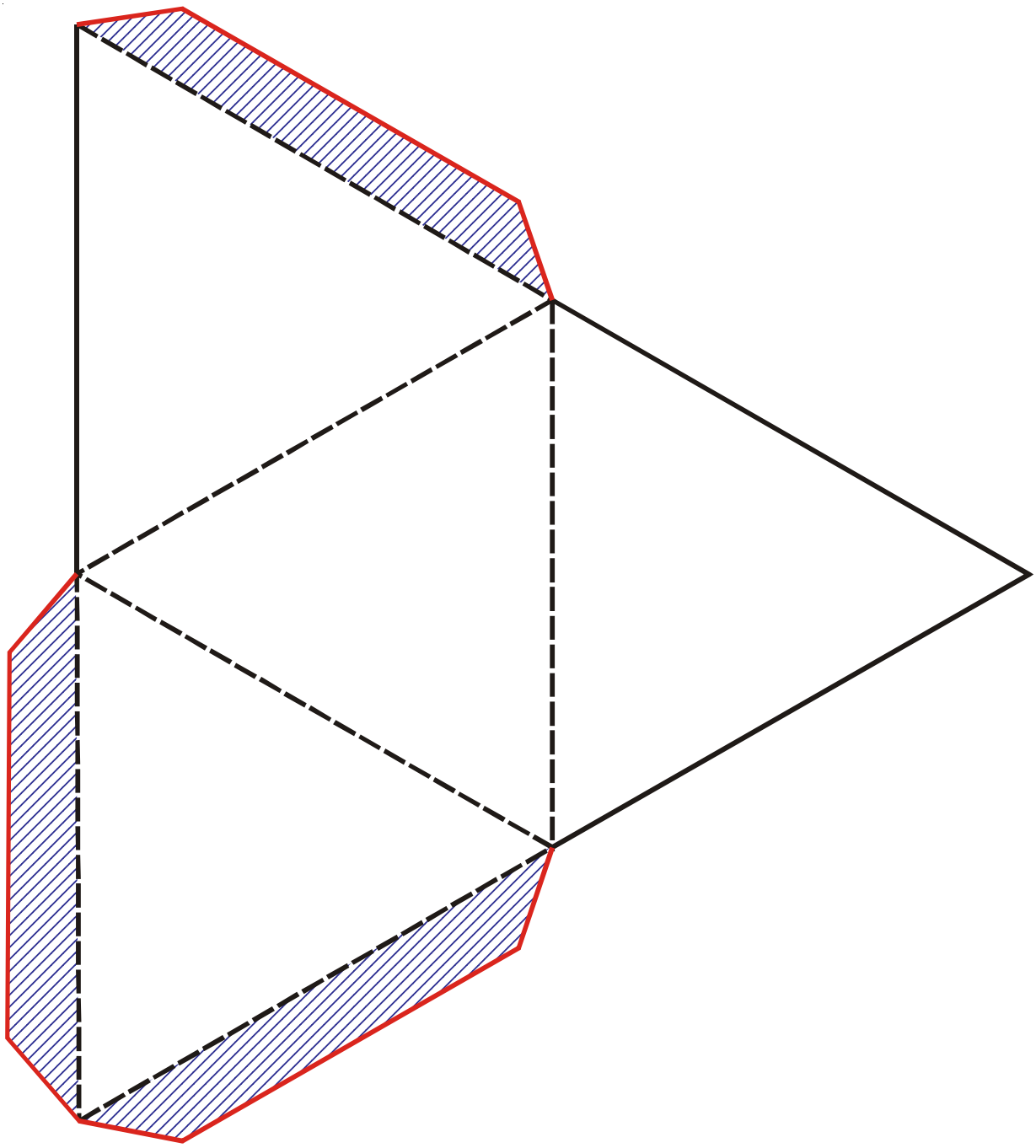
3) a) A prism has 5 faces, 9 edges and 6 vertices.
What is its name?

b) A pyramid has 4 faces, 6 edges and 4 vertices.
What shape must its base be?

G12b

3D Shapes - Models

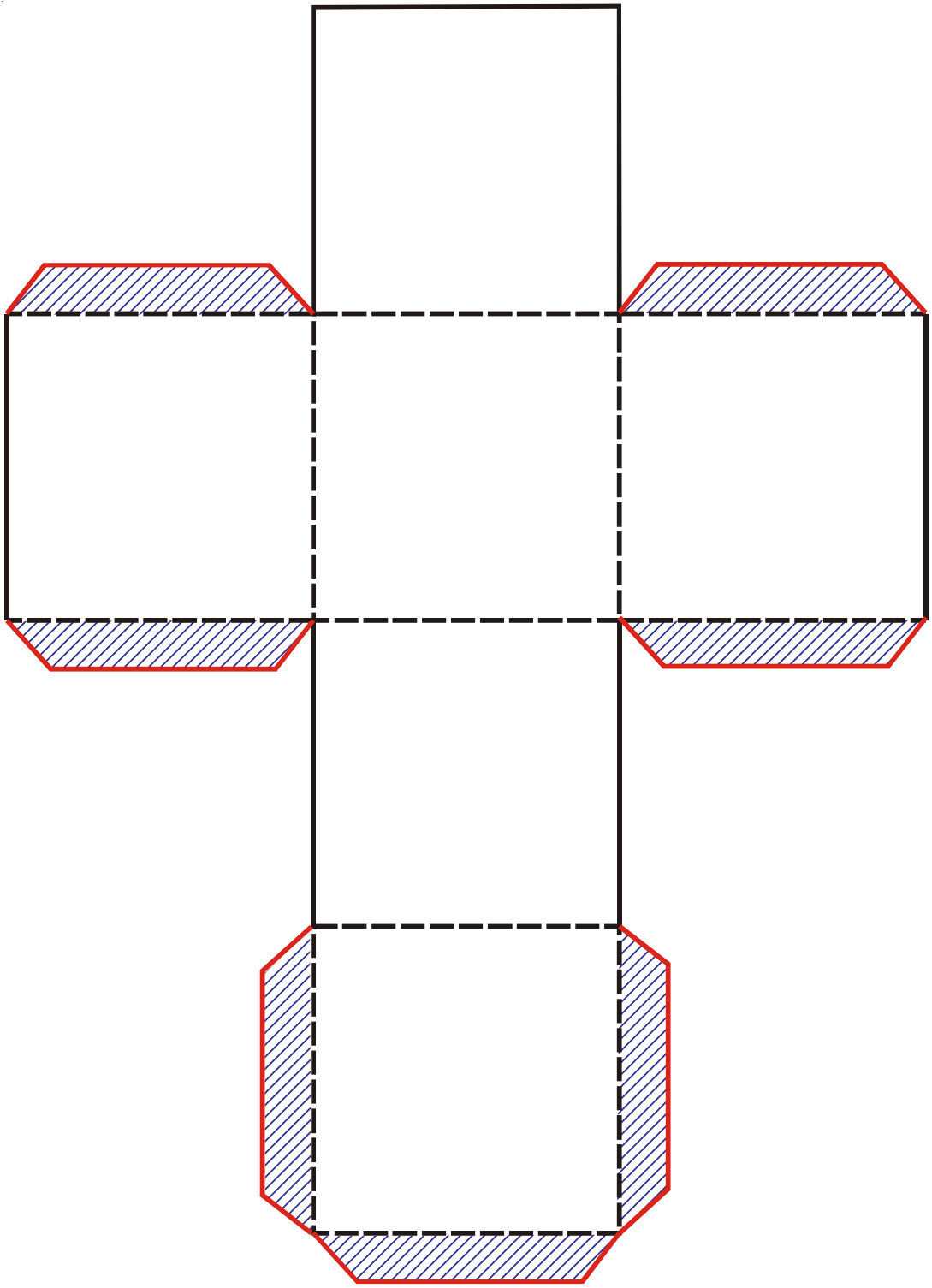
Print this page onto card.
Cut out the net and score along all the dotted lines with a compass point.
Put glue on the shaded tabs, fold and stick to make a **TETRAHEDRON**.



G12b

3D Shapes - Models

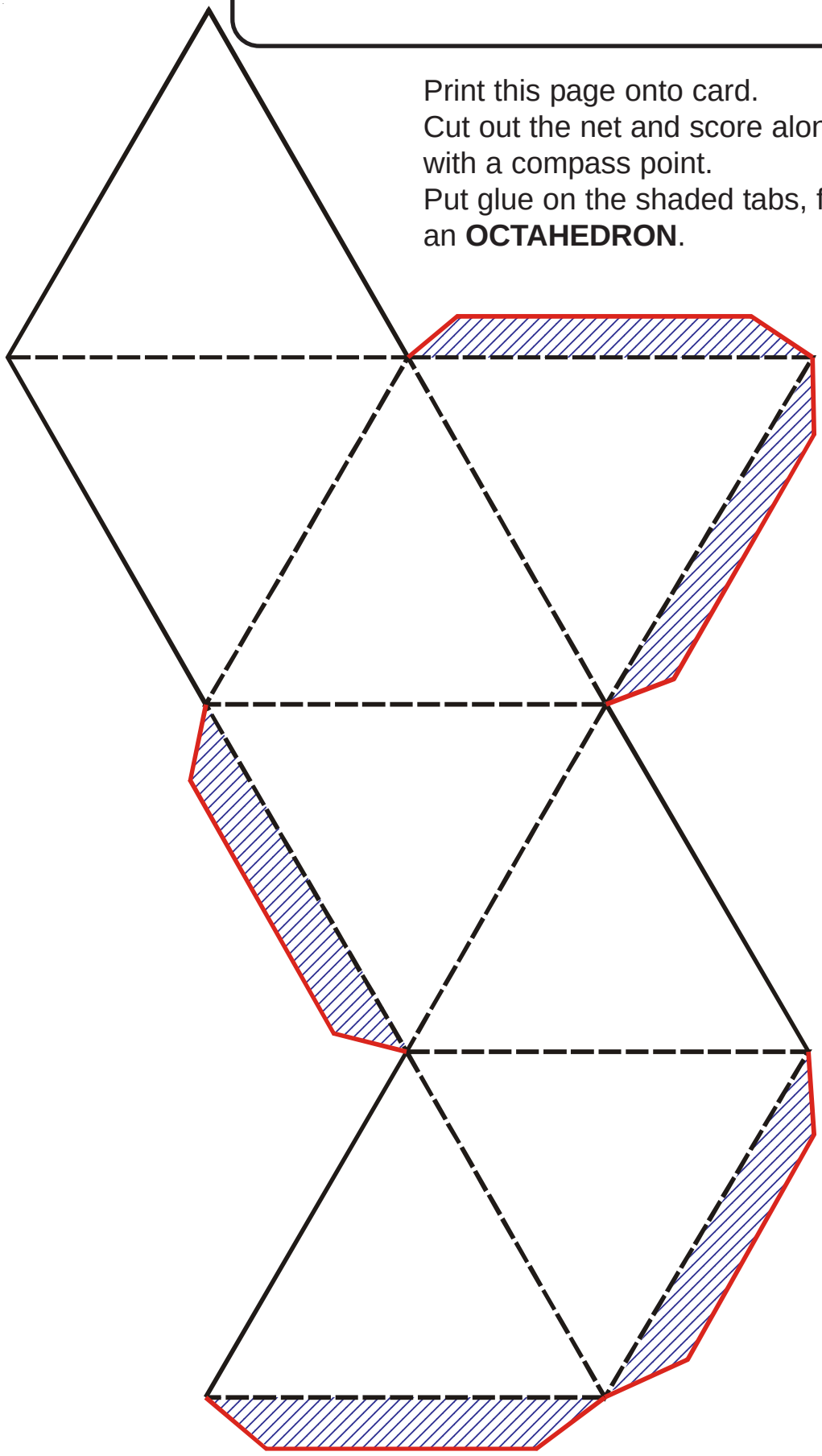
Print this page onto card.
Cut out the net and score along all the dotted lines with a compass point.
Put glue on the shaded tabs, fold and stick to make a **CUBE**.



G12b

3D Shapes - Models

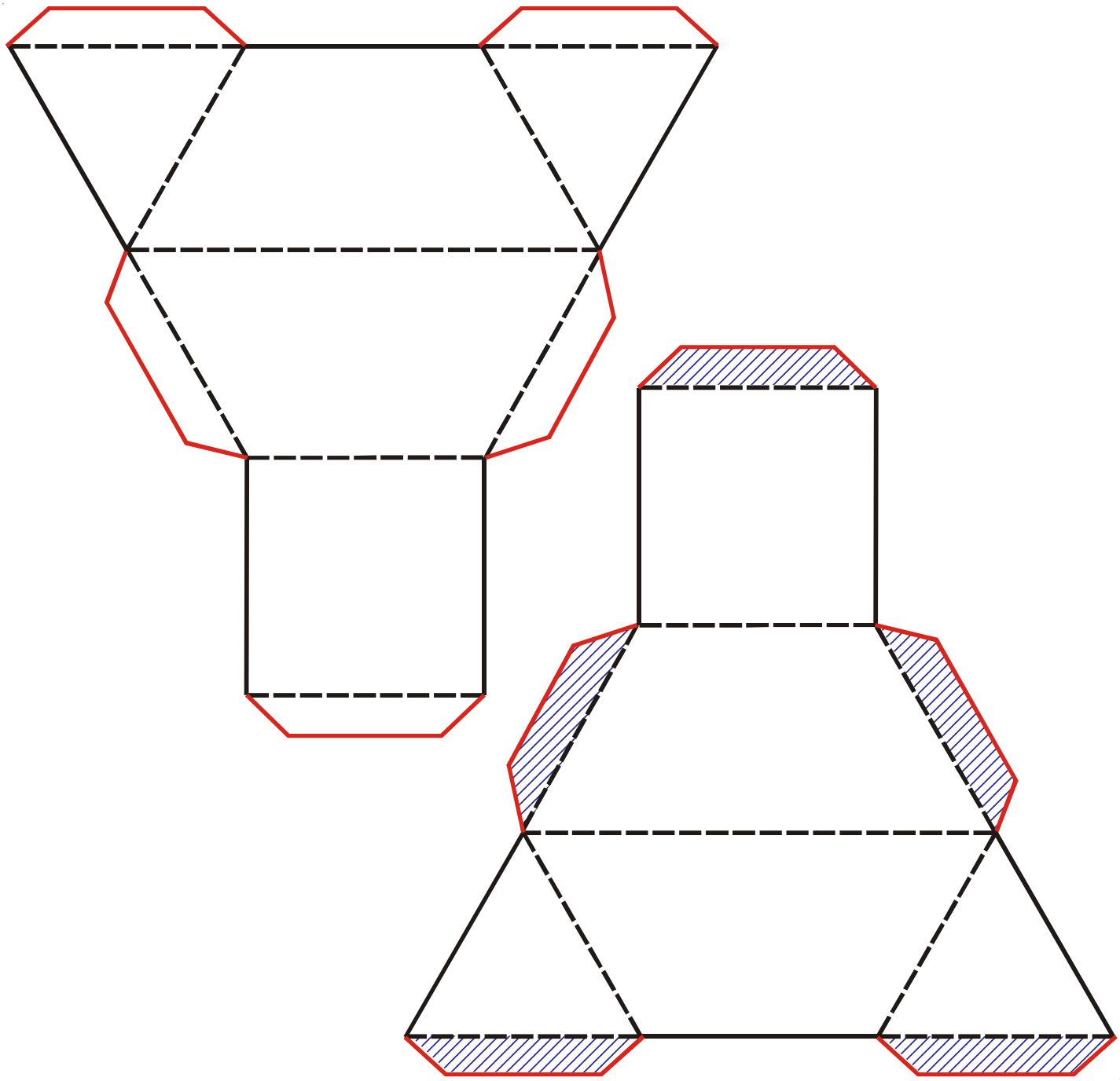
Print this page onto card.
Cut out the net and score along all the dotted lines with a compass point.
Put glue on the shaded tabs, fold and stick to make an **OCTAHEDRON**.



G12b

3D Shapes - Models

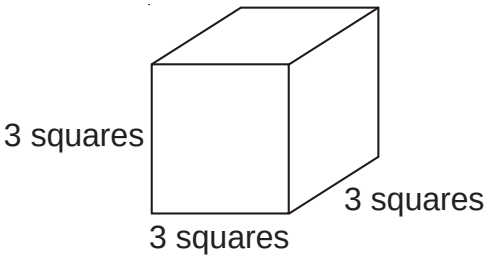
Print this page onto card.
Cut out, score and glue each net to make two 3D shapes.
You now have a two-piece jigsaw.
Can you fit both pieces together to make a TETRAHEDRON.
When you can do it, challenge other people to try.



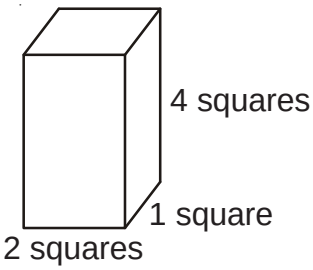
G12c

3D Shapes - Nets

a) Draw a net of this cube.



b) Draw a net of this cuboid.



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.

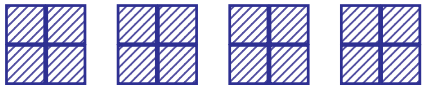
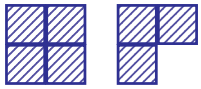
e) England will win the World Cup in 2018.

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

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.

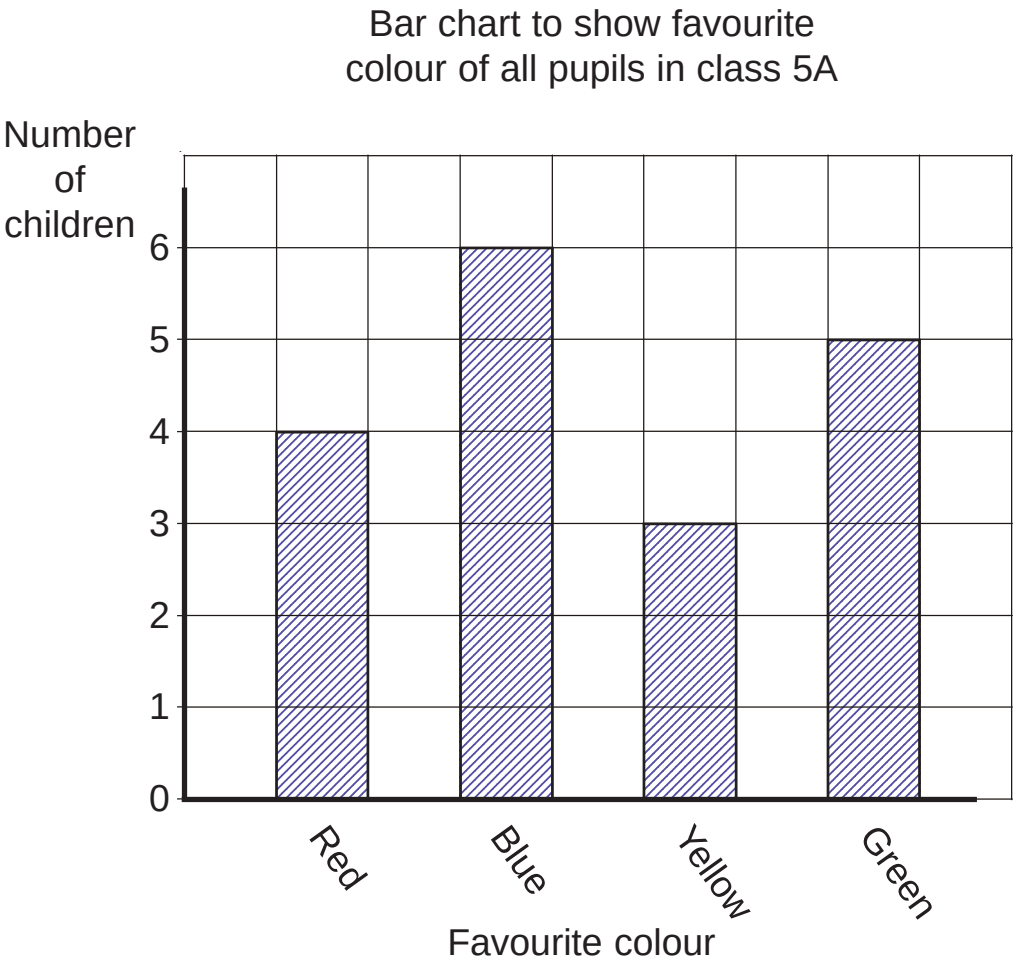
The pupils chose which colour they would like and this is shown in the table below.

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?

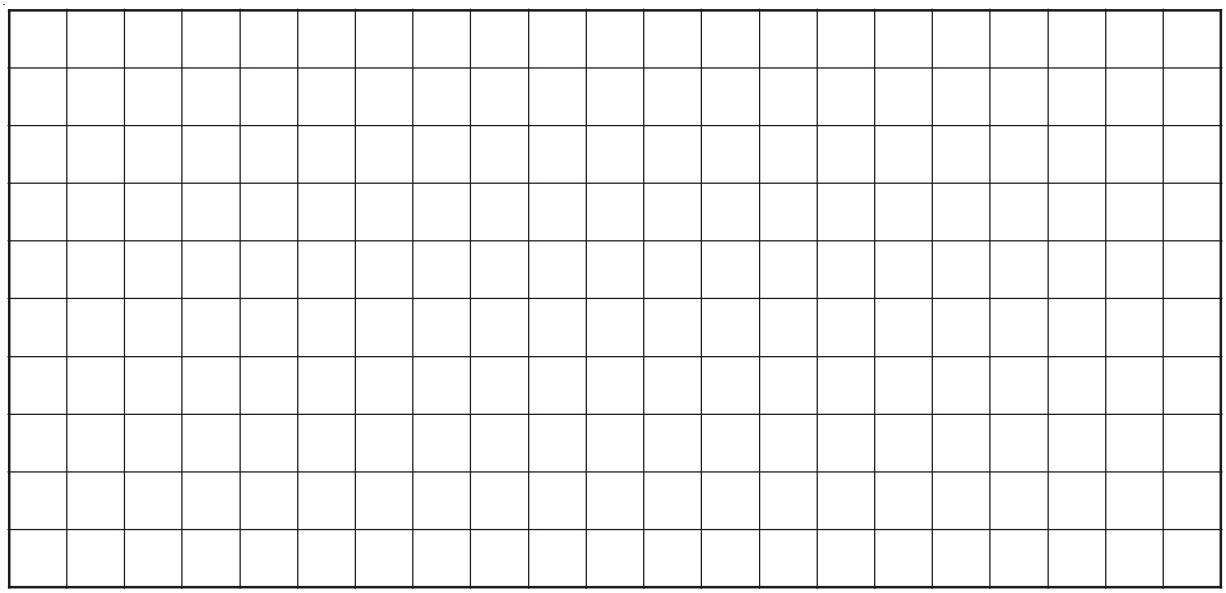
S2b Bar Charts - Drawing

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.



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.

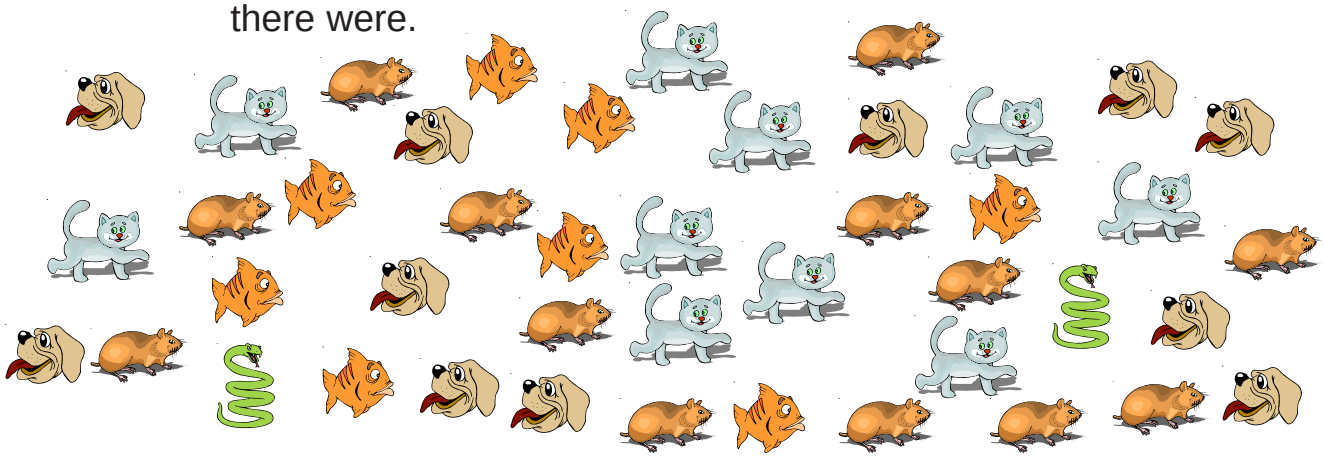
These are the results:

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'.