Expected

Expected

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.

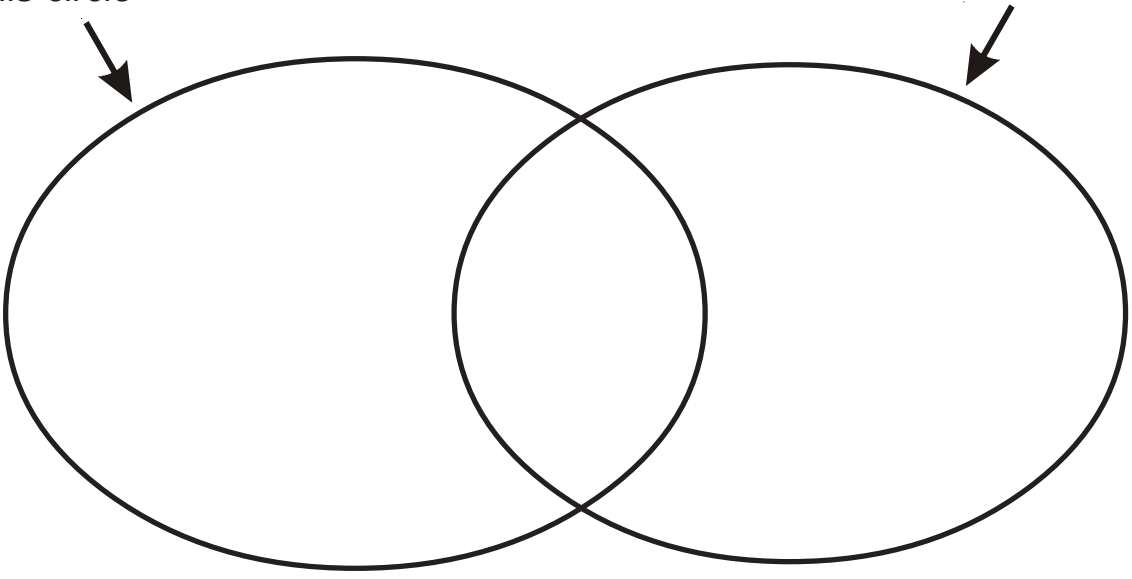
Find the next three numbers which have an odd number of factors.

---

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

Factors of 24 in this circle

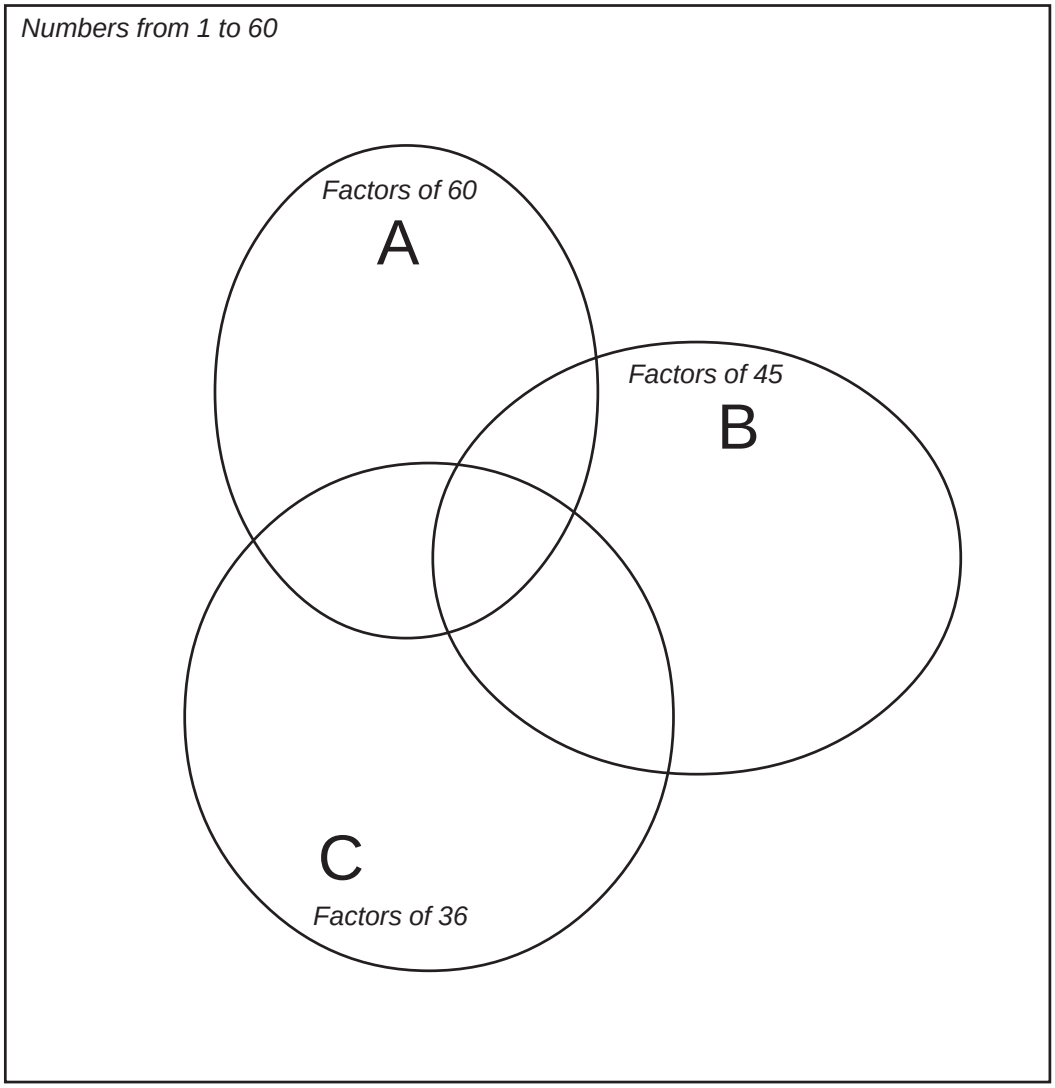
Factors of 40 in this circle



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.

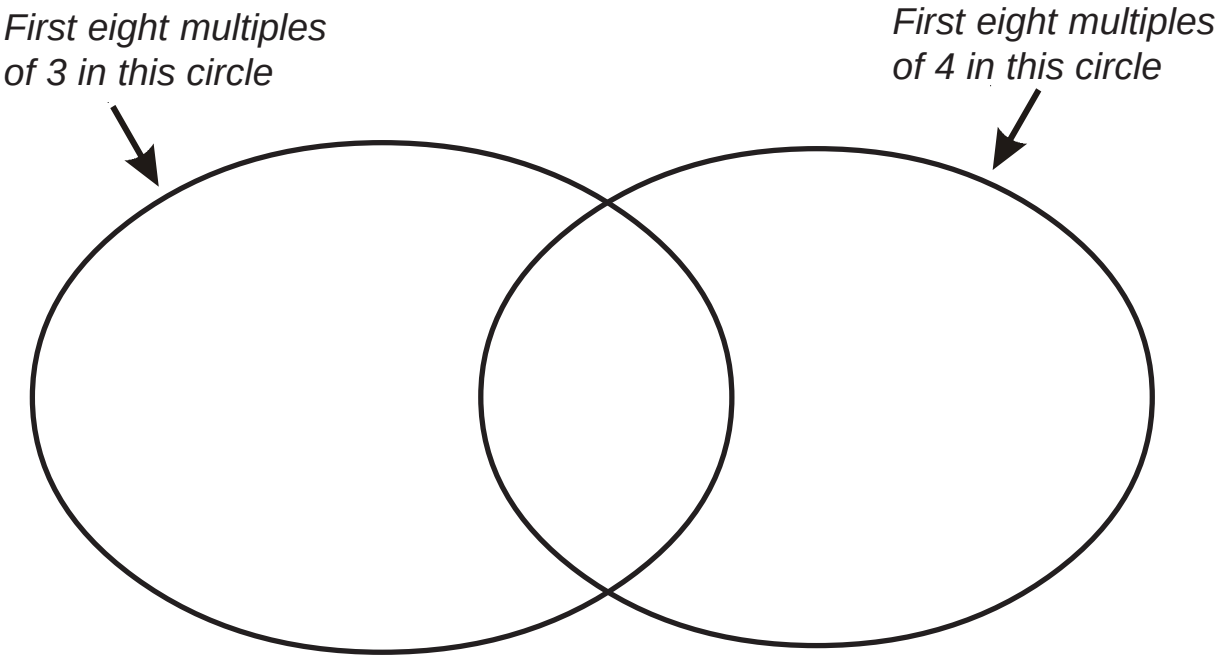
b) Write down the first five multiples of 7.

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) $\square + \bigcirc = 4.6$

b) $\square + \bigcirc = 11.26$

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 = _____

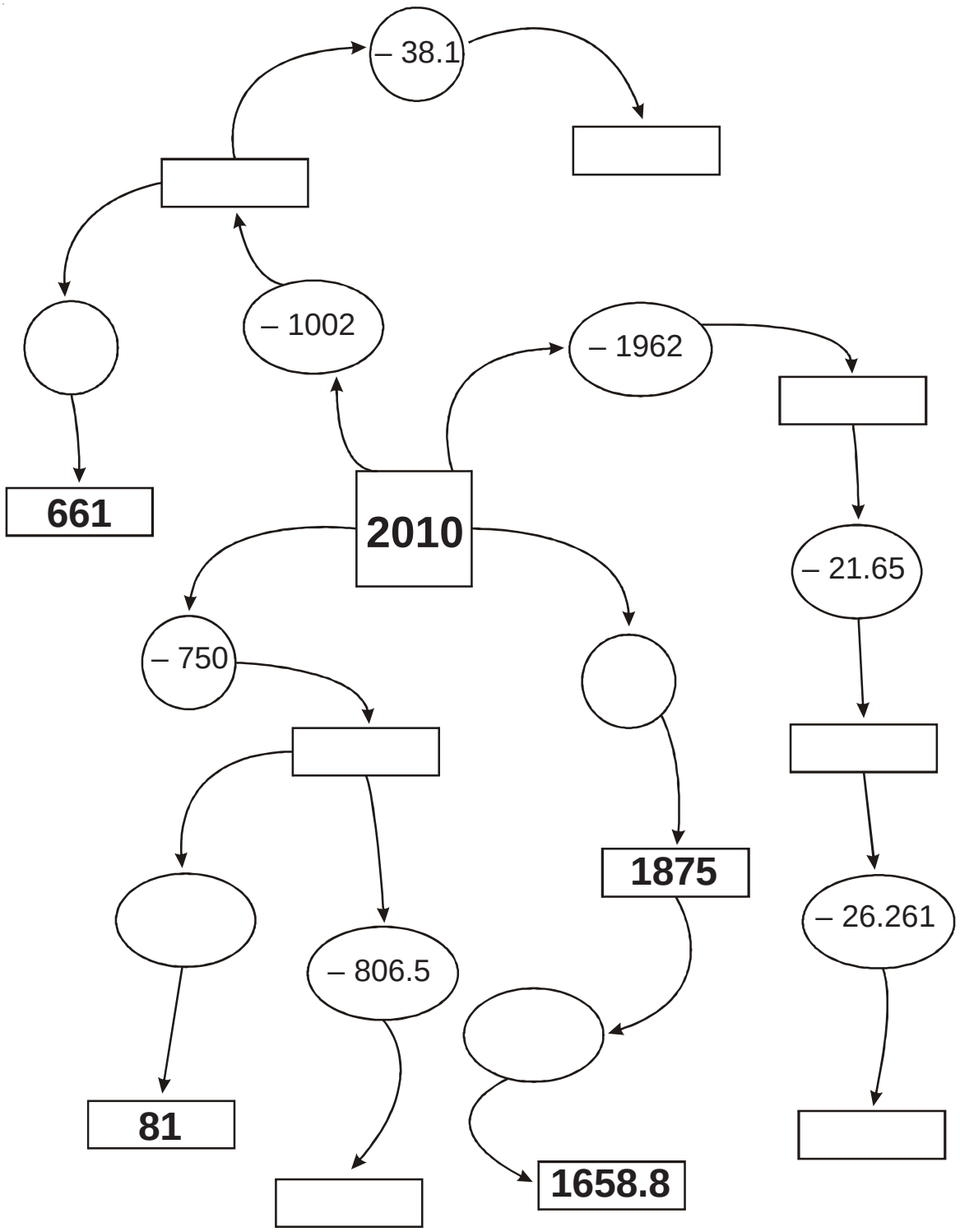
3) 94.78 – 36 = _____

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) $289 \times 7 =$ _____

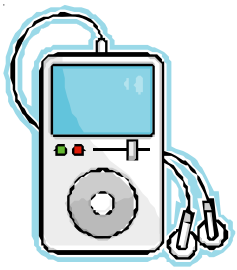
10) $113 \times 9 =$ _____

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) $6.205 \div 36.5 =$ ____

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

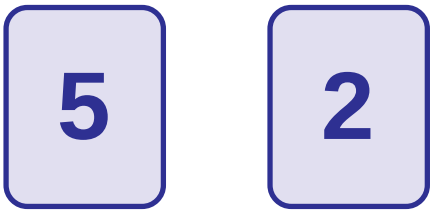
You owe five people £1.25 each but someone owes you £3.50

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.

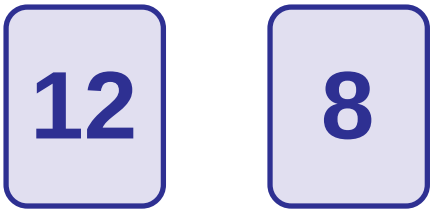
He then adds the numbers he can see.

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)

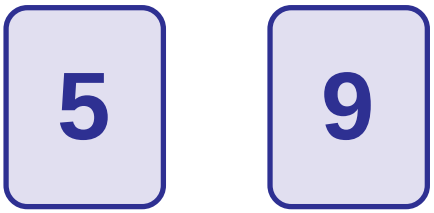


The totals with these cards are:

11, 13, 20 and 22.

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

3)

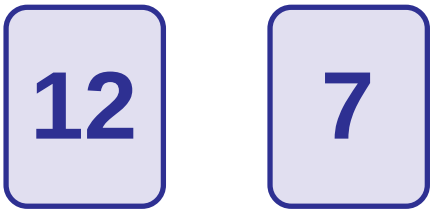


The totals with these cards are:

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?

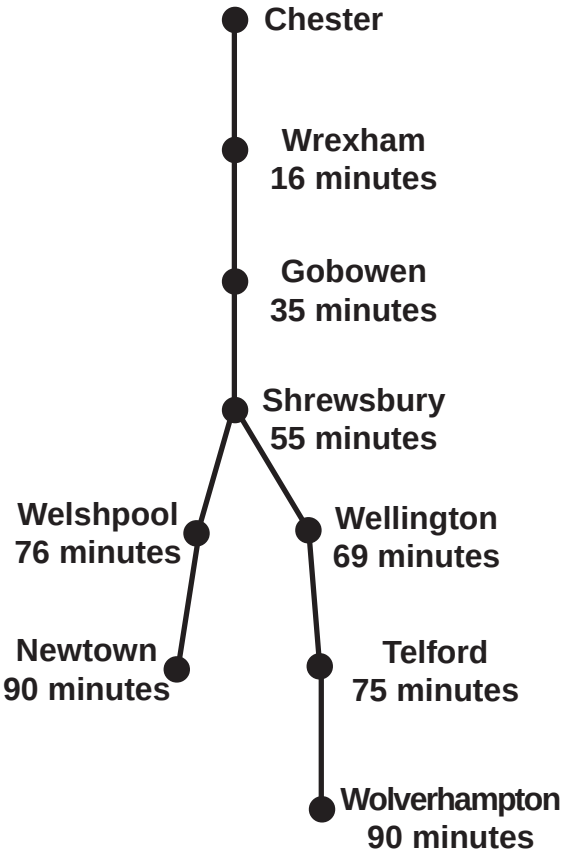
c) Alex travels to Euston.
She gets on the 07:24 train from Stoke.
How long will her journey take?

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.

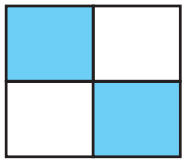
Complete the following sentences:

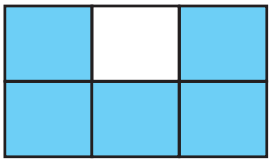
a) If you start with 1296 and press the square root key of your calculator twice,the answer given is _____ .

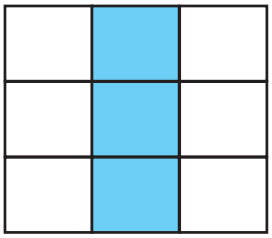
b) If you start with _____ and press the square root key of your calculator twice, the answer given is 5 .

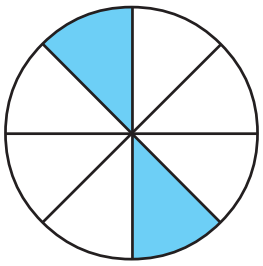
N23a Introduction to Fractions Shading

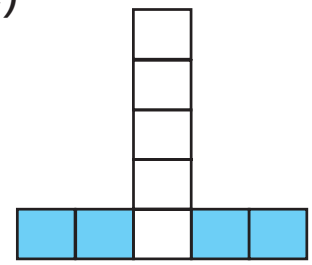
1) What fractions of the following shapes are shaded?

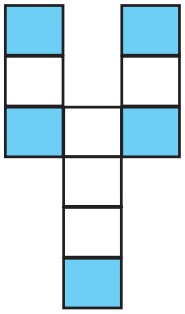
a) 

b) 

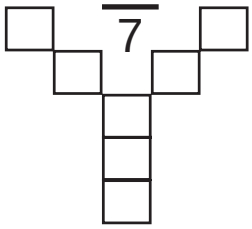
c) 

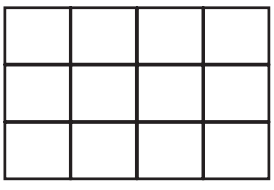
d) 

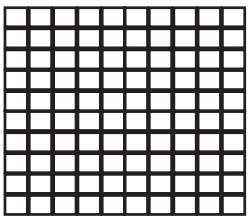
e) 

f) 

2) Shade the shapes according to the given fractions.

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

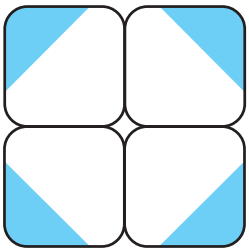
b) $\frac{1}{3}$ 

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

N23a Introduction to Fractions Shading

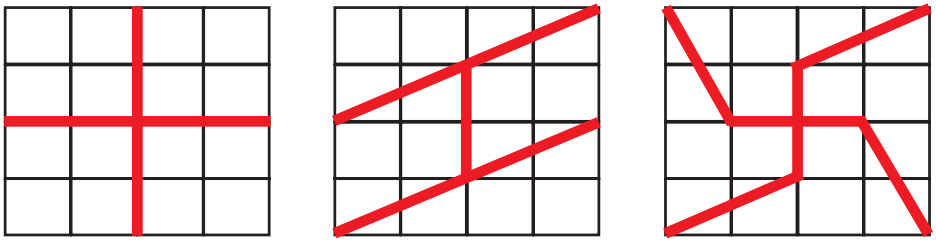
1) $\frac{1}{3}$ of this shape is shaded.

a) What fraction of this diagram is shaded?

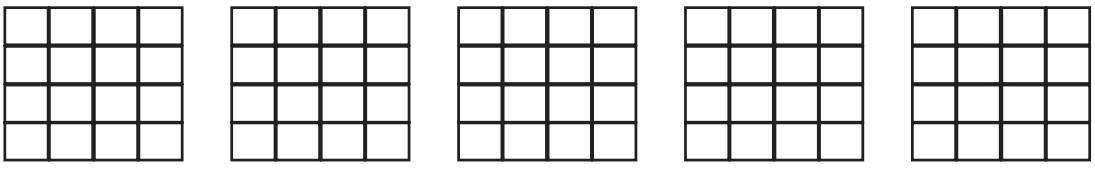


b) What fraction of this diagram is shaded?

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 $\frac{12}{16}$.

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

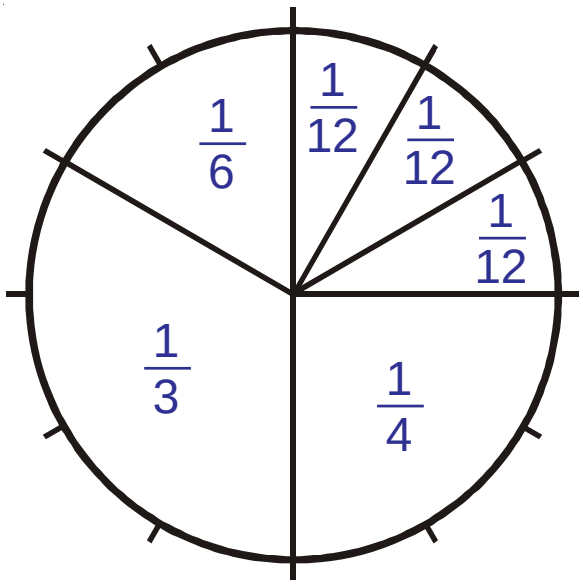
2) Use the diagram below to help you fill in the missing numbers.

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) $\frac{45}{90}$

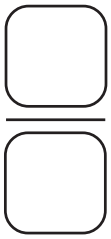
d) $\frac{75}{100}$ e) $\frac{40}{180}$ f) $\frac{68}{116}$

N23c Introduction to Fractions Simplifying

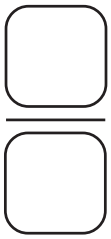
Here are six number cards.

2	5	9	7	4	11

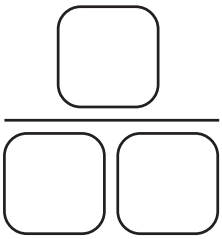
a) Choose two of these six cards to make a fraction that is equal to $\frac{45}{99}$.



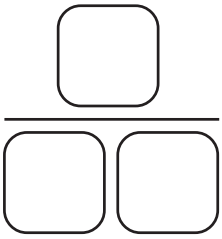
b) Choose two of these six cards to make a fraction that is equal to $\frac{112}{144}$.



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

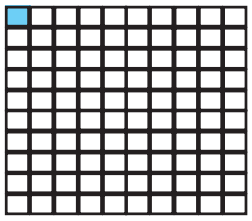


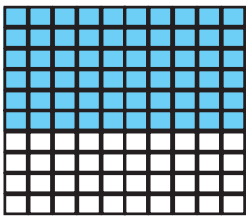
d) Choose three of these six cards to make the smallest possible fraction.

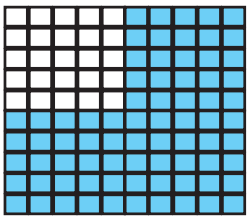


N24a Percentages Introduction

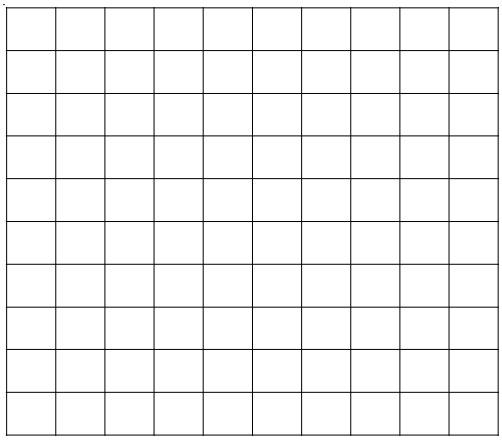
1) What percentage of the shapes below are shaded?

a) 

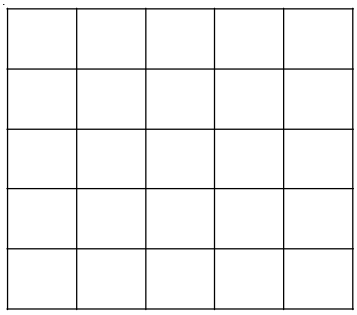
b) 

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

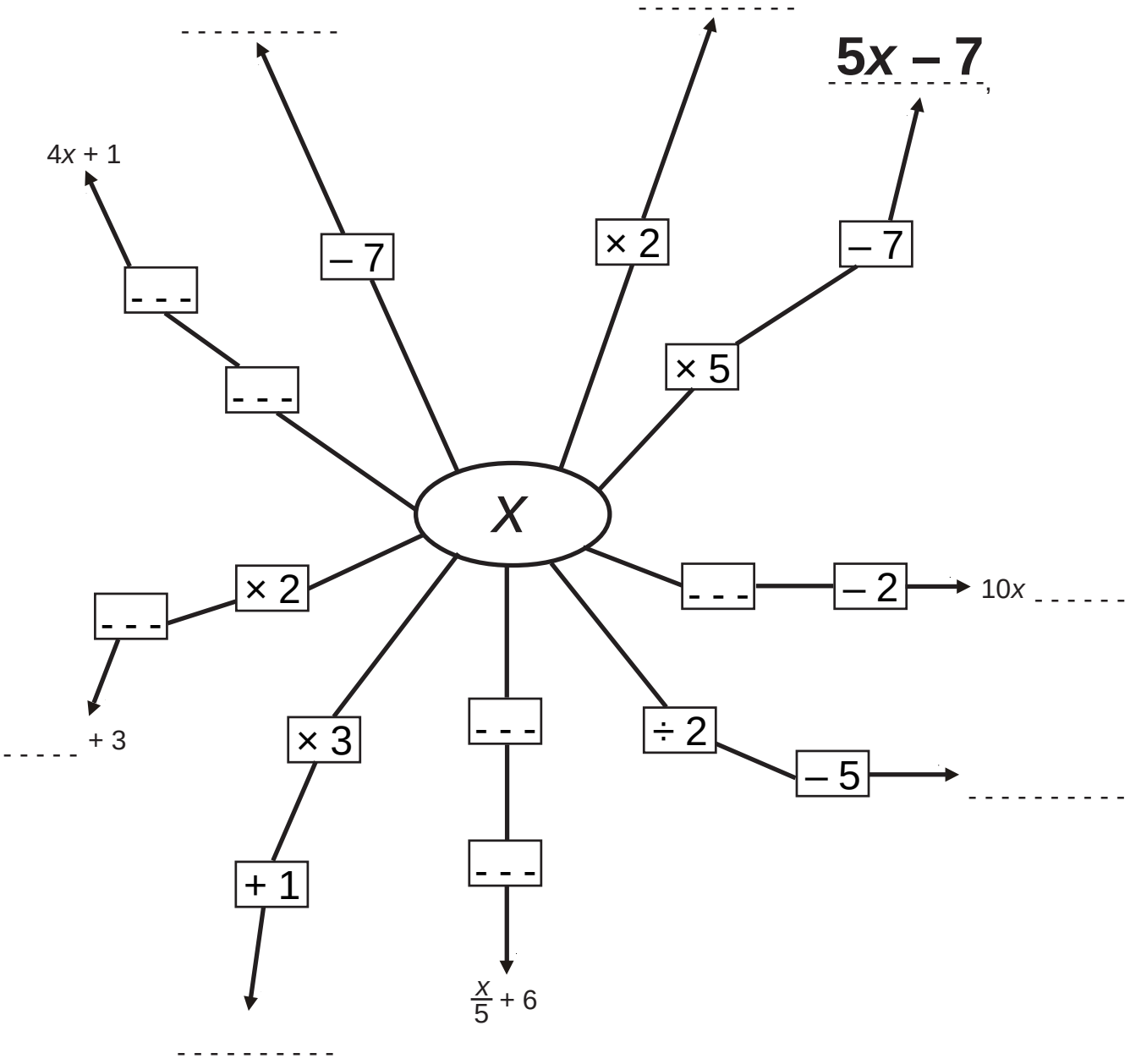
e) → – 7 → ÷ 2 → 3.5

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

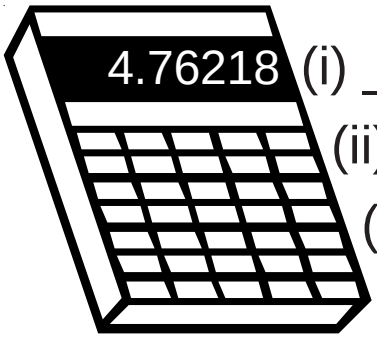
j) 99.961

N27b Rounding Decimal Places

Round each of the numbers on the calculators to

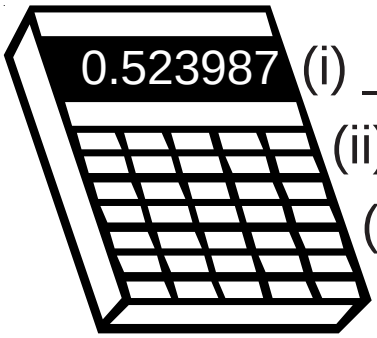
(i) 1 d.p.
(ii) 2 d.p.
(iii) the nearest whole number.

1)



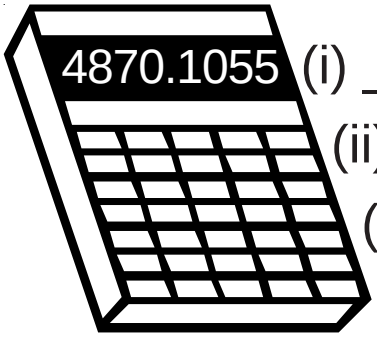
(i) ____
(ii) ____
(iii) ____

2)



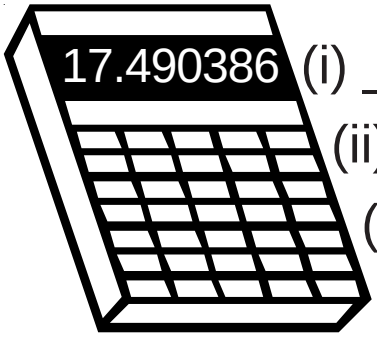
(i) ____
(ii) ____
(iii) ____

3)



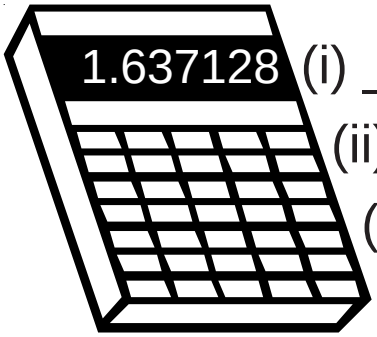
(i) ____
(ii) ____
(iii) ____

4)



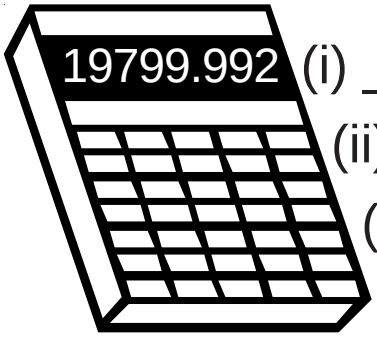
(i) ____
(ii) ____
(iii) ____

5)



(i) ____
(ii) ____
(iii) ____

6)



(i) ____
(ii) ____
(iii) ____

A5 Horizontal and Vertical Lines

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

a) $x = 3$

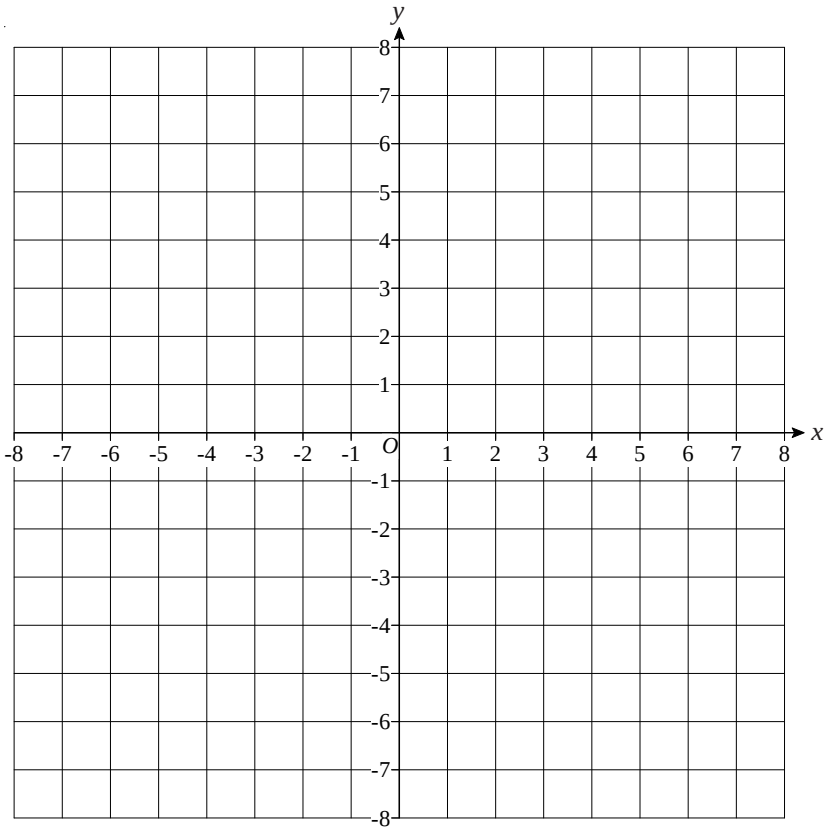
b) $x = -4$

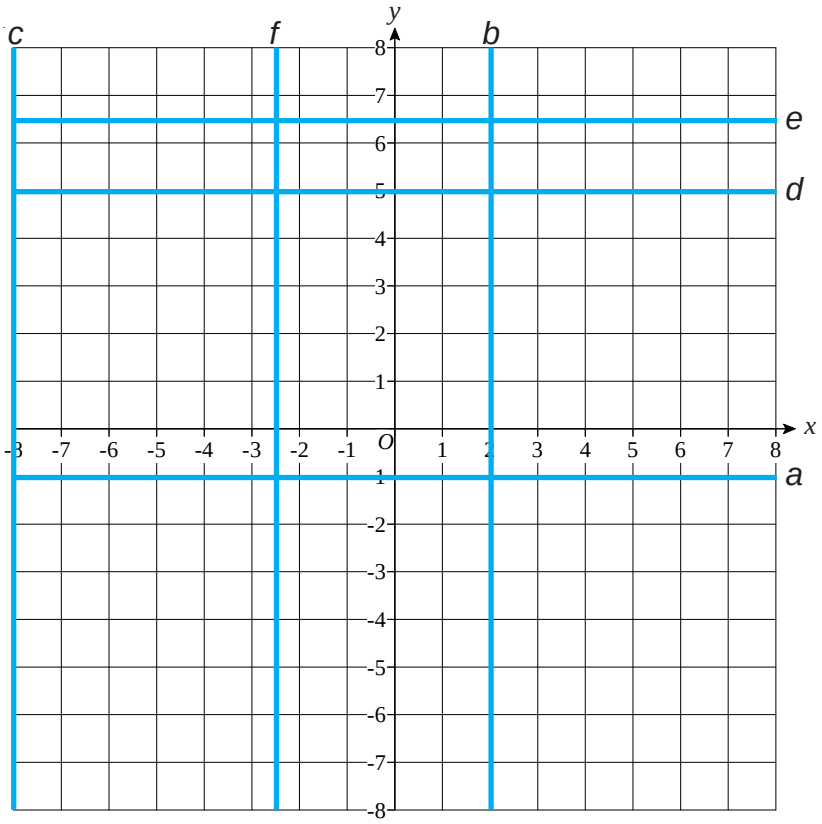
c) $y = 1$

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

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) $n + 2$

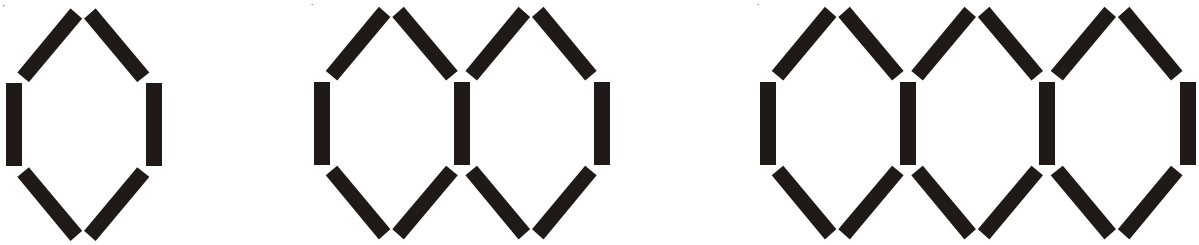
c) $5n + 2$

d) $4n - 7$

e) $10n + 9$

A11c Sequences
Finding the *n*th Term

1)



Pattern 1 Pattern 2 Pattern 3

a) Draw pattern 4

b) How many lines would be in Pattern 6?

c) How many lines would be in Pattern *n*?

2) Work out the *n*th term of the following number patterns.

a) 2, 4, 6, 8, ...

b) 3, 5, 7, 9, ...

c) 5, 8, 11, 14, ...

d) 1, 5, 9, 13, ...

e) 12, 22, 32, 42, ...

f) 2, 8, 14, 20, ...

g) 3, 4.5, 6, 7.5, ...

3) Write down the first four terms and the 10th term of the following number patterns.

a) $n \longrightarrow 3n$

b) $n \longrightarrow 3n + 2$

c) $n \longrightarrow n - 3$

d) $n \longrightarrow 2n + 5$

e) $n \longrightarrow 3n - 7$

f) $n \longrightarrow 5n + 3$

g) $n \longrightarrow 4n - 1$

A12 Solving Basic Equations

1) Solve

a) $x + 5 = 8$

b) $x + 7 = 9$

c) $x - 3 = 12$

d) $x - 6 = 10$

e) $2 + x = 5$

f) $2x = 14$

g) $3x = 30$

h) $\frac{x}{2} = 8$

i) $\frac{x}{5} = 7$

j) $\frac{4x}{3} = 8$

2) Solve

a) $5x + 2 = 17$

b) $3x - 1 = 17$

c) $2x + 10 = 20$

d) $4x - 7 = 29$

e) $4 + 2x = 14$

f) $\frac{x}{2} + 3 = 7$

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

h) $\frac{2x}{5} - 1 = 9$

i) $\frac{3x}{2} + 5 = 11$

j) $\frac{4x}{5} + 6 = 8$

A13a Rearranging Formulae Basics

1) Rearrange to make x the subject of the formula

a) $y = x - 2$

b) $y = x + 7$

c) $y = x + t$

d) $y = 5x + 3$

e) $y = 2x - 4$

2) Rearrange to make x the subject of the formula

a) $3x + 2 = y$

b) $4x - 1 = y$

c) $ax - 3 = y$

d) $ax + m = t$

e) $x + y = t$

3) Rearrange to make x the subject of the formula

a) $y = x + t - v$

b) $ax - c = y$

c) $y = ax - tv + c$

d) $y + x = ct$

e) $c + ax + t = y + m$

A13b Rearranging Formulae Harder Questions

1) Rearrange to make x the subject of the formula

a) $\frac{x+2}{3} = y$

b) $y = \frac{x-4}{5}$

c) $\frac{5x-2}{4} = y$

d) $\frac{ax+c}{m} = y$

e) $k = \frac{t+mx}{y}$

2) Rearrange to make x the subject of the formula

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

b) $y = \frac{2x}{5} - 8$

c) $y = \frac{cx}{t} + m$

d) $y = abx + c$

e) $\frac{mx}{t} + c = y$

3) Rearrange to make x the subject of the formula

a) $y = 4(x + t)$

b) $y = a(x - m)$

c) $at(c + x) = y$

d) $y + m = a(c + x)$

e) $t - v = m(x - y)$

4) Rearrange to make x the subject of the formula

a) $\frac{x-u}{4} = y$

b) $\frac{x+a}{b} = c$

c) $\frac{3(x+2)}{c} = y$

d) $\frac{a(x+b)}{c} = d$

e) $\frac{t(x+c)}{d} = e + f$

A14a Straight Line Graphs Introduction

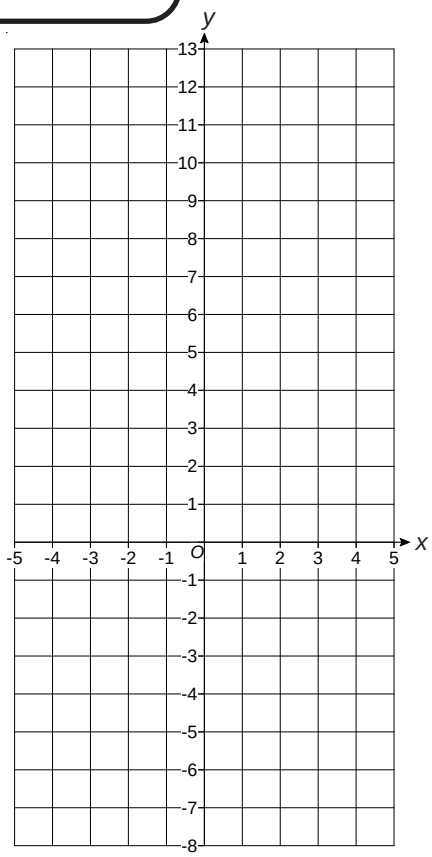
1) a) Complete the table of values for $y = 3x - 2$

x	-2	-1	0	1	2	3	4	5
y								

b) Plot the graph of $y = 3x - 2$

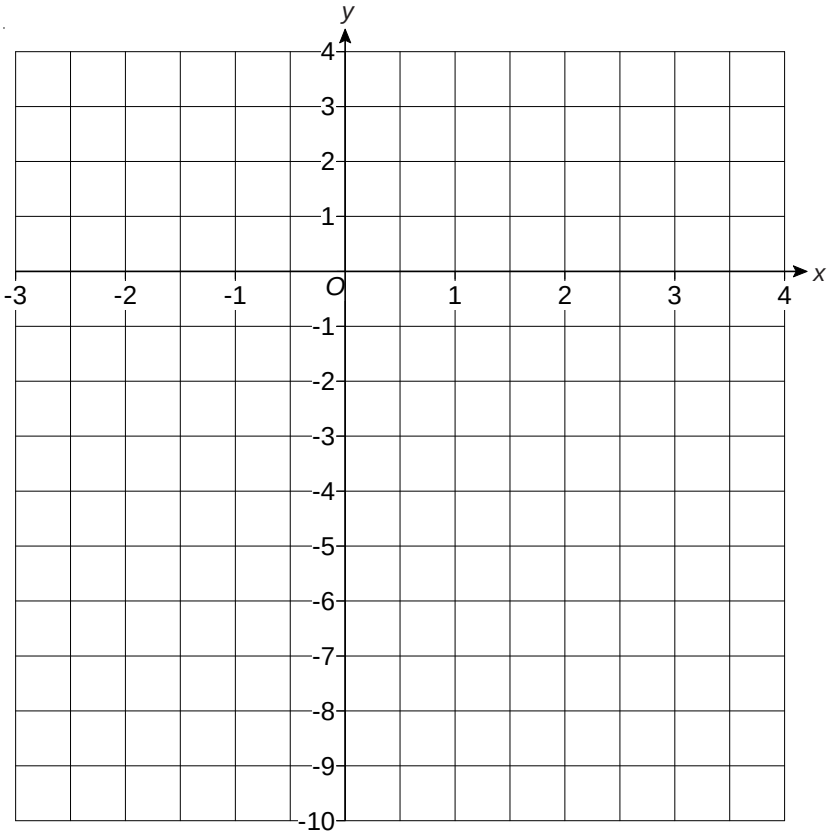
c) Use your graph to estimate the value of x when $y = 2$

d) Use the graph to estimate the value of x when $y = -4$



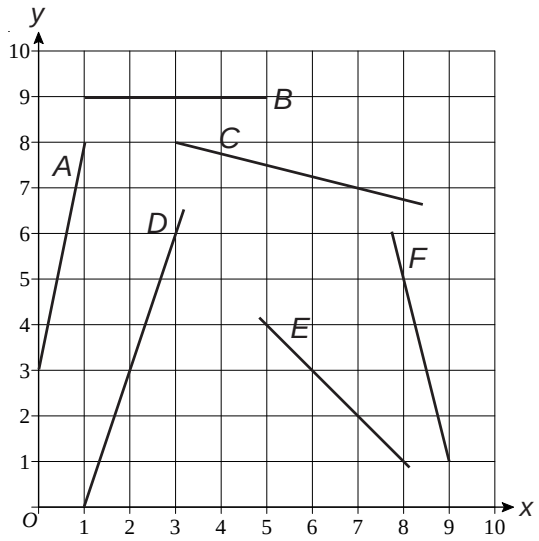
2) a) Plot the graph of $y = 2x - 4$

b) Plot the graph of $x + y = 1$

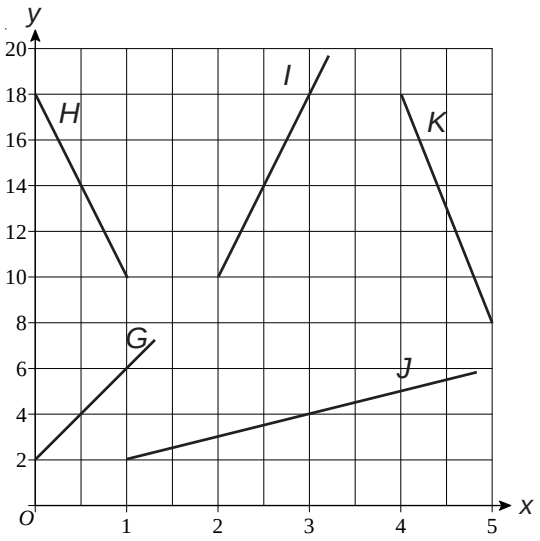


A14b Straight Line Graphs Gradient

1) Find the gradients of the lines *A* to *F*.



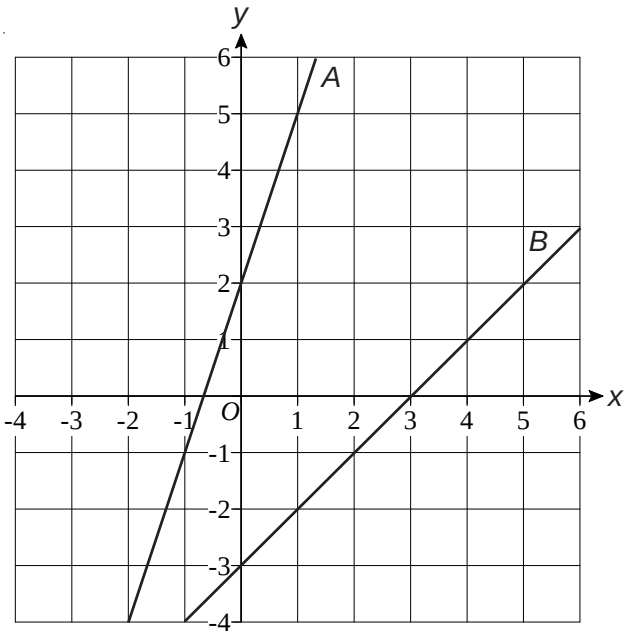
2) Find the gradients of the lines *G* to *K*.



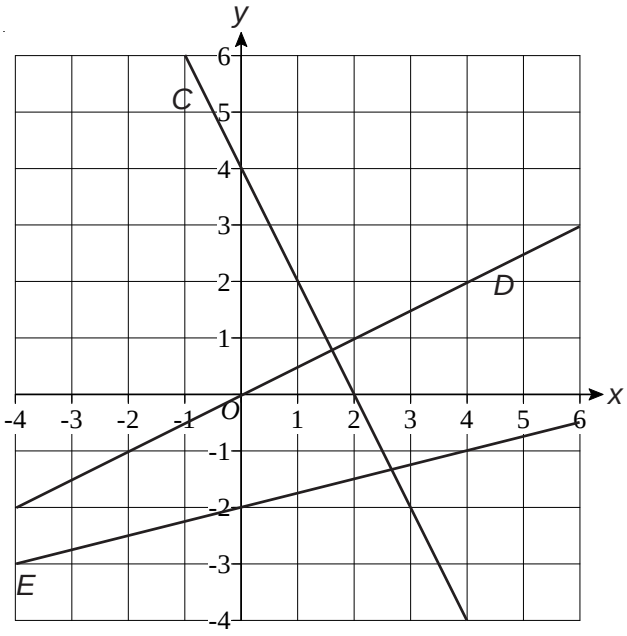
A14c Straight Line Graphs

$y = mx + c$

1) Find the equations of lines *A* and *B*.



2) Find the equations of lines *C*, *D* and *E*.

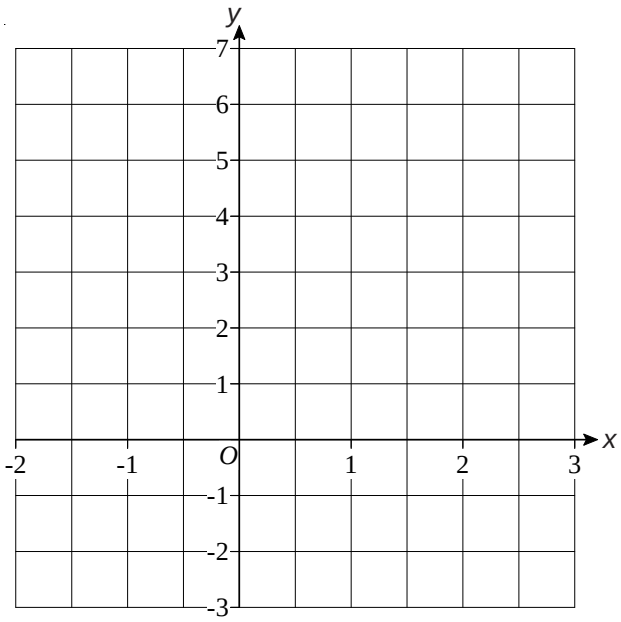


A15 Draw Quadratic Graphs

1) a) Complete the table of values for $y = x^2 - 2$

b) Draw the graph of $y = x^2 - 2$

x	-2	-1	0	1	2	3
y		-1			2	

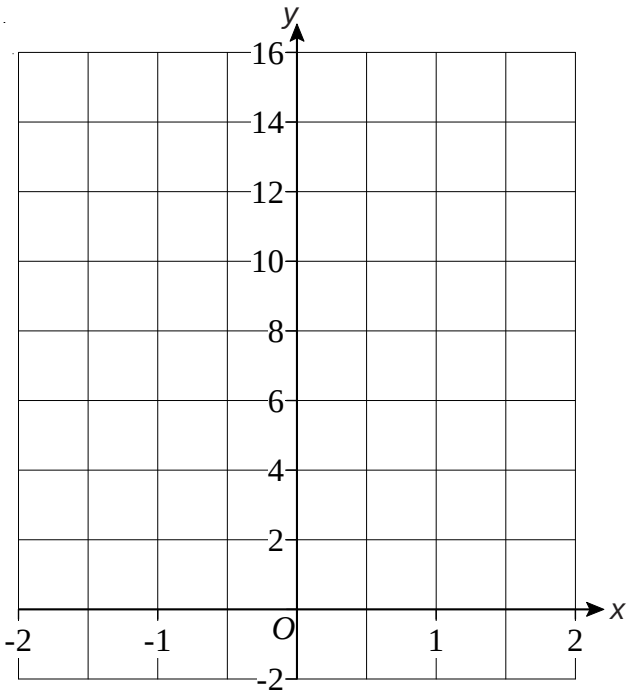


c) Use the graph to estimate the values of x when $y = 1$

2) a) Complete the table of values for $y = 4x^2$

b) Draw the graph of $y = 4x^2$

x	-2	-1	0	1	2
y		4			16



c) Use the graph to estimate the value of y when $x = 1.5$

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?

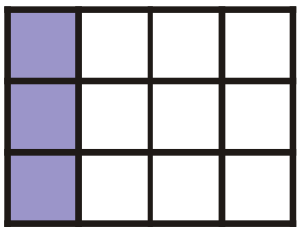
   b) What is the price per unit, to the nearest penny if Julie buys the yoghurts in the cheapest way?

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?

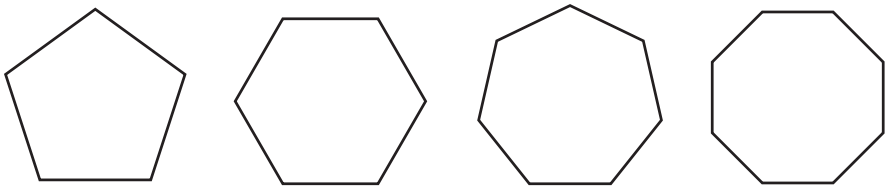
9) Len makes some concrete by mixing cement, sand and gravel in the ratio 1 : 4 : 3.
If he uses 8 bags of sand, how many bags of cement and gravel will he use?

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?

R6 Scale Factors - Maps

1) The scale on a map is 1 : 2500

   a) The school and the church are 8 cm apart on the map.

      How far apart are they in real life?
      Give your answer in metres.

   b) Two villages are 3.2 km apart in real life.

      How far apart would they be on the map?
      Give your answer in centimetres.

2) The scale on a map is 1 : 10 000

   a) Two towns are 17 km apart.

      How far apart would they be on the map?
      Give your answer in centimetres.

   b) The viewpoint and the pier are 7.1 cm apart on the map.

      How far apart would they be in real life?
      Give your answer in kilometres.

3) A model car is made with a scale of 1 : 18

   If the model is 25 cm long, how long is the real car?
   Give your answer in metres.

R7 Simple Interest

1) Phil saves £800 in his bank account.

   The bank pays 2% simple interest per year.

   a) How much interest will he have earned after one year?

   b) How much money will he have in the bank after one year?

2) Nikki saves £350 in her bank account.

   The bank pays 2.5% simple interest per year.

   a) How much interest will she have earned after three years?

   b) How much money will she have in the bank altogether after five years?

3) Jean saves £960 in her bank account.

   The bank pays 4% simple interest per year.

   a) How much interest will she have earned after one year?

   b) How much interest will she have earnd after 6 months?

   c) How much interest will she have earnd after 4 months?

R8 Direct Proportion

1) 4 litres of orange juice cost £3.20.
   a) What is the cost of 8 litres?
   b) How much would 20 litres cost?
   c) How much would you pay for 6 litres?
   d) What is the cost of 5 litres?

2) 15 voice minutes cost 45p.
   What is the cost of
   a) 30 voice minutes?
   b) 150 voice minutes?

3) If £1 is worth 1.12 euros, how many euros would you get for £150?

4) Use direct proportion to solve the following problems:
   a) 5 litres of water cost £3.00.
      How much would 9 litres cost?
   b) A recipe for two people uses 90 g of flour.
      How much flour is needed for 5 people?
   c) 20 blank CD-Roms cost £3.20.
      How much do 75 CD-Roms cost?
   d) A litre of water costs 62p.
      What is the cost of 2.5 litres of water?
   e) 3 kg of cheese costs £7.50
      What is the cost of 6.5 kg of cheese?
   f) 2 litres of smoothie contains 900 ml of orange juice.
      How much orange juice is in 8.5 litres of smoothie?
   g) A 120 ml carton of yoghurt contains 12 g of sugar.
      How much sugar would be in a 200 ml carton of yoghurt?

R8 Direct Proportion

1)

Miles	Kilometres
5	8
10	
	24
	32
50	

a) Use direct proportion to complete this conversion table.

b) The distance between London and Birmingham is 120 miles.
Use the table to work out this distance in kilometres.

c) The distance between London and Paris is 460 kilometres.
Use the table to work out this distance in miles.

2) Here are three offers for voice minutes on a mobile phone.

A

Minutes	Cost
1	£0.04
5	£0.20
40	£1.60

B

Minutes	Cost
2	£0.24
10	£1.00
100	£7.00

C

Minutes	Cost
10	£0.70
50	£3.50
60	£4.20

In which of the offers are the numbers in direct proportion?
In each case, explain your answer.

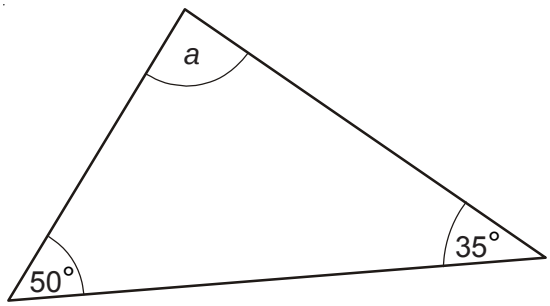
3) A jar has 200 sleeping flies in it and the lid is firmly on.
The weight of the jar, when empty is 1 kg.
The weight of the jar and sleeping flies is 1.9 kg (1900 g).

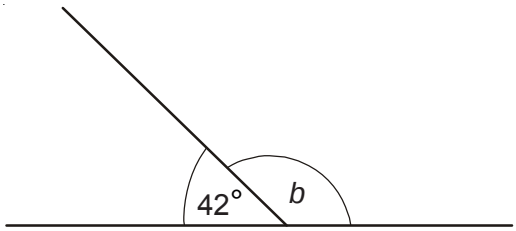
a) If all the flies are the same weight, what is the weight of one fly?

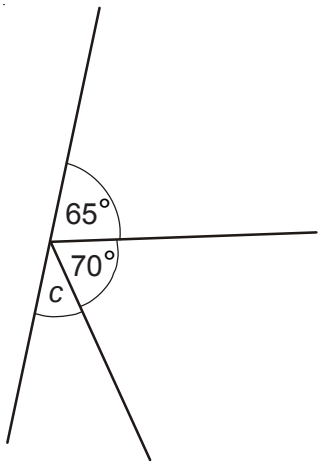
b) Tina shakes the jar so that all the flies are now awake and flying around.
What will the weight of the jar of flies be, now?

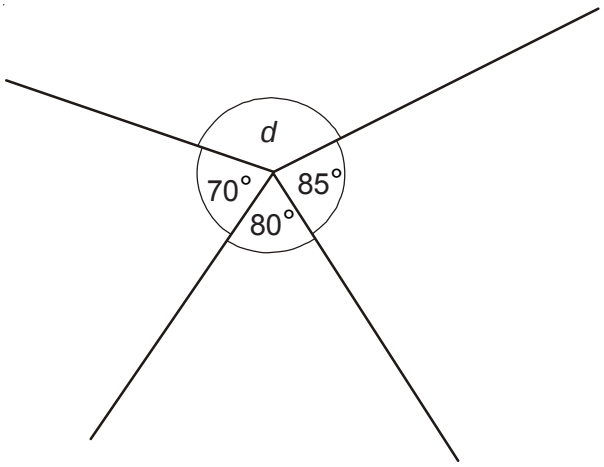
G13 Angle Facts

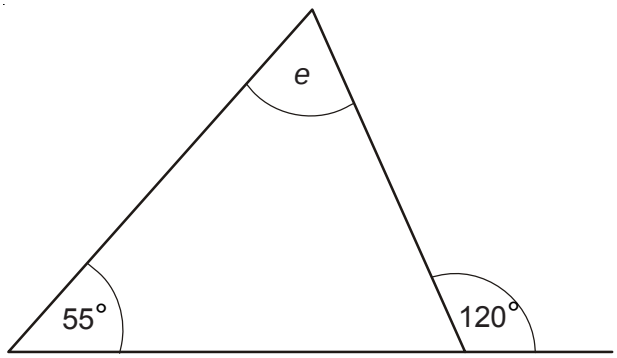
1) Work out the size of angles *a* to *h*.

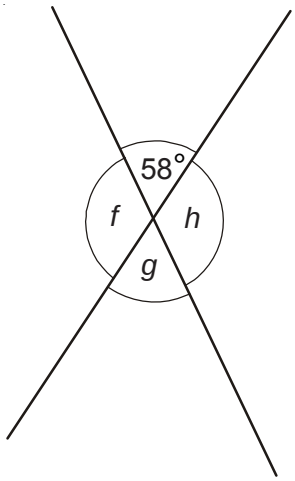








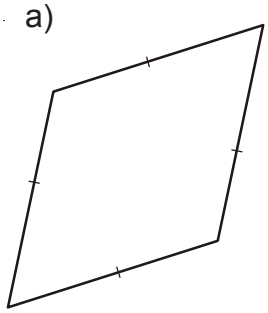




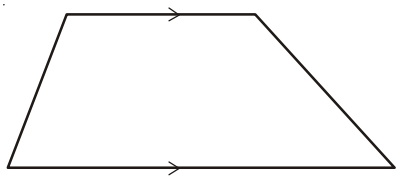
G14 Properties of Quadrilaterals

1) Write down the names of the quadrilaterals a) to g)

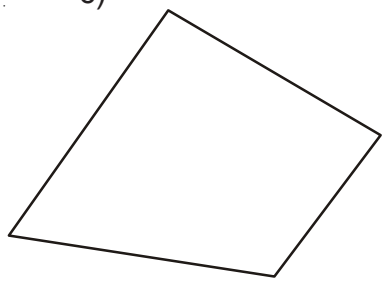
a)



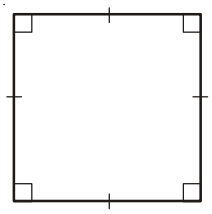
b)



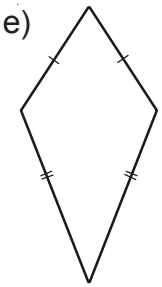
c)



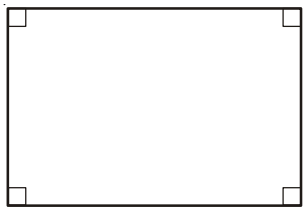
d)



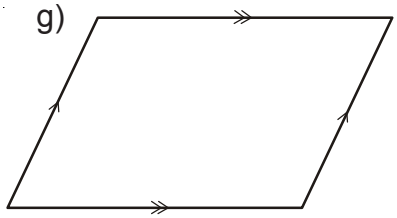
e)



f)



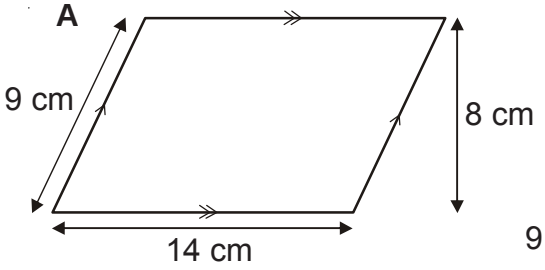
g)



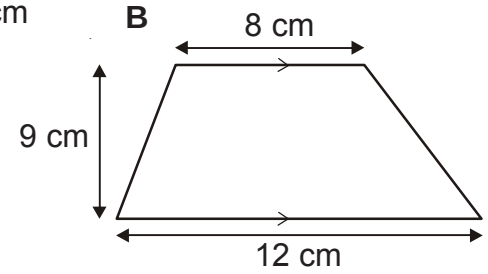
2) Fill in the table for quadrilaterals A, B and C.

Shape	*Number of lines of symmetry*	*Order of rotational symmetry*	*Area*
A			
B			
C			

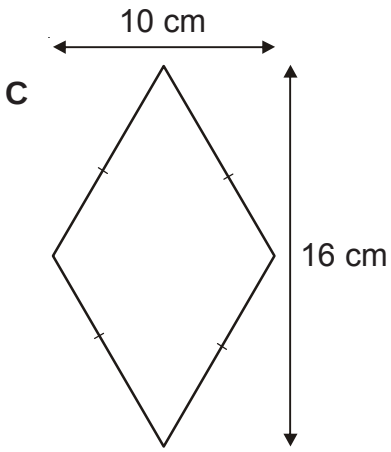
A



B



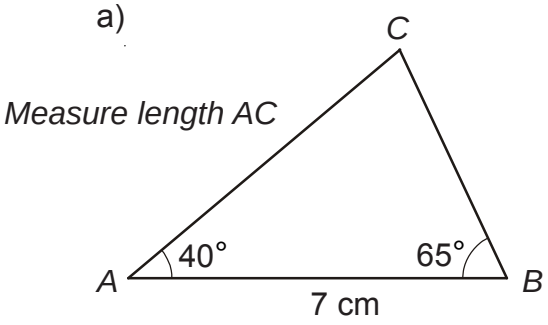
C



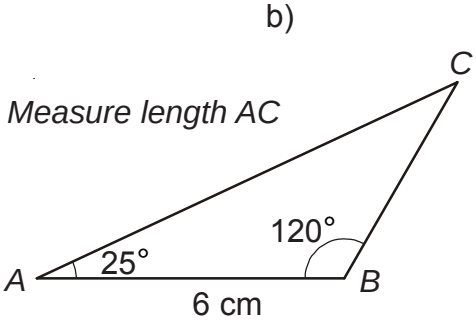
G15 Scale Drawings

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.

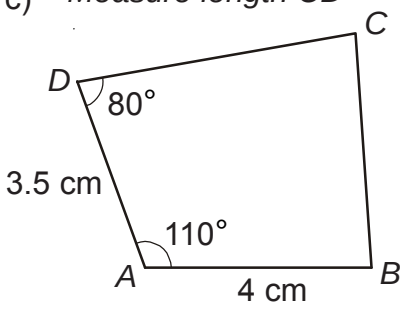
a)



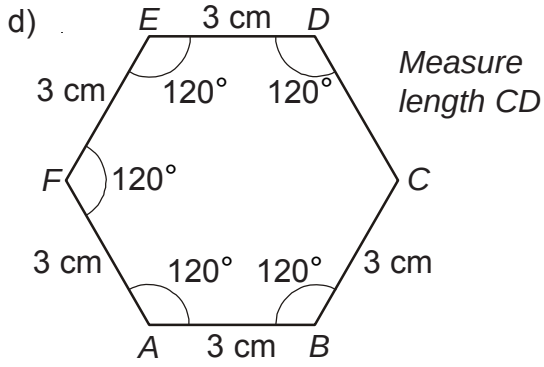
b)



c) Measure length CD

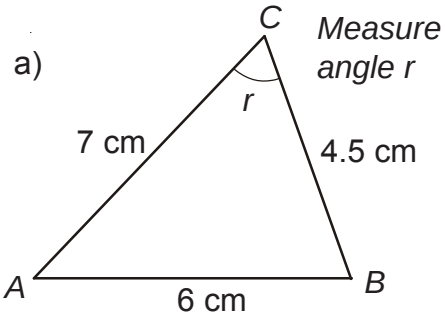


d)

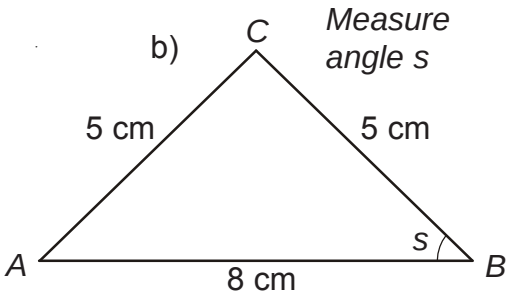


2) Using only a ruler, pencil, compasses and protractor as needed, draw the following diagrams accurately.
For each diagram, measure and write down the angle you are asked for.

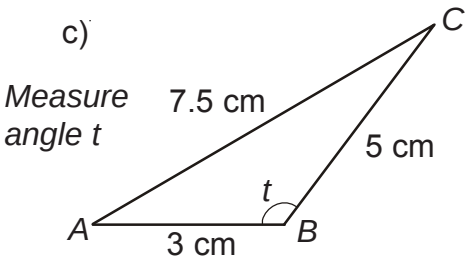
a)



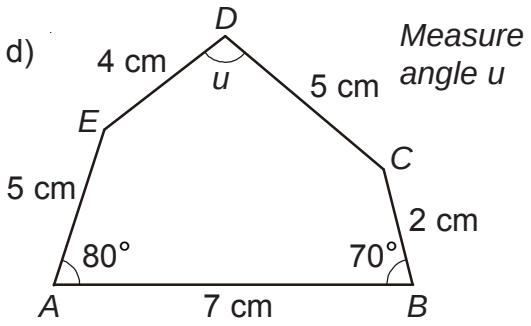
b)



c)

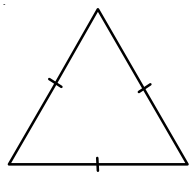


d)



G16 Properties of Special Triangles

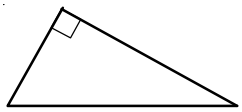
1) Write the special name for each type of triangle next to it and fill in the gaps in the description.

a) 

Name: _ _ _ _ _ _ _ _ _ _

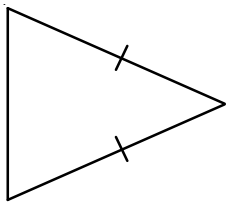
_ _ equal sides

_ _ equal angles

b) 

Name: _ _ _ _ _ _ _ _ _ _

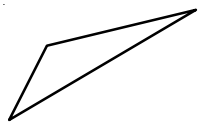
One angle of _ _

c) 

Name: _ _ _ _ _ _ _ _ _ _

_ _ equal sides

_ _ equal angles

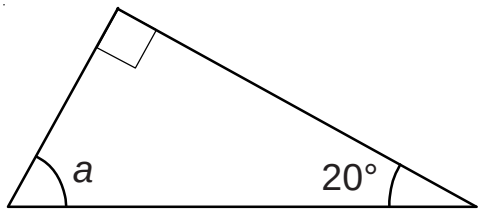
d) 

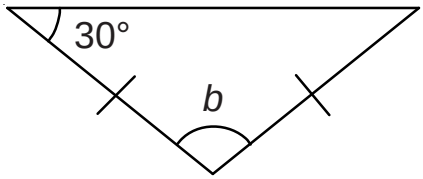
Name: _ _ _ _ _ _ _ _ _ _

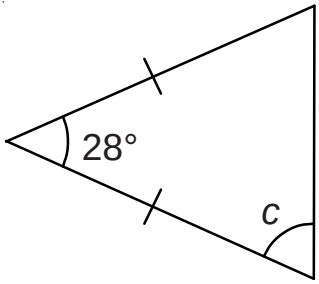
_ _ equal sides

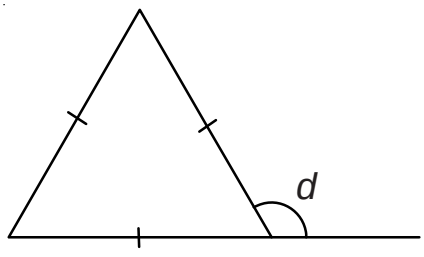
_ _ equal angles

2) Find the missing angles.



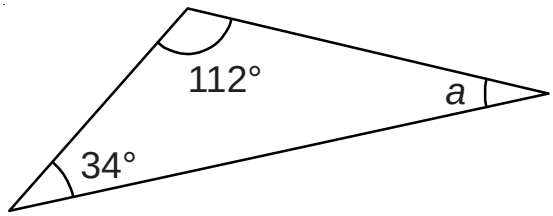


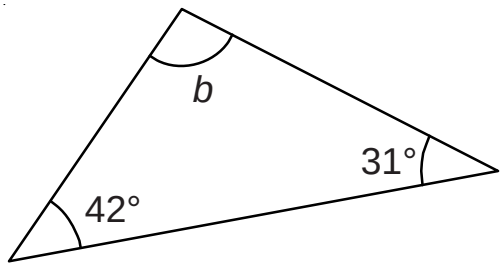




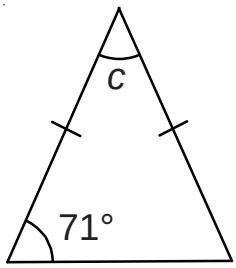
G17 Angles in a Triangle Calculation

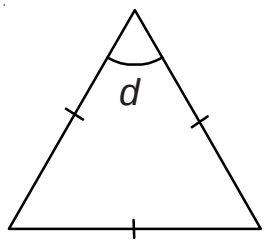
1) Work out the size of the missing angles.

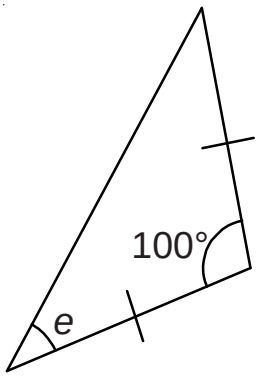




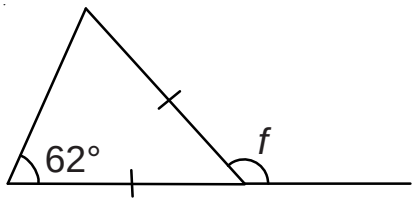
2) Work out the size of the missing angles.

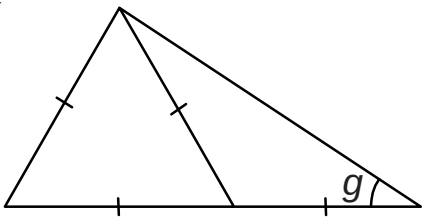


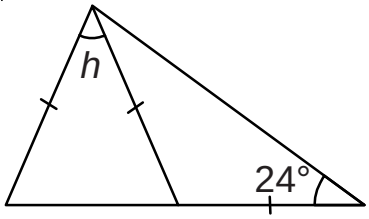




3) Work out the size of the missing angles.



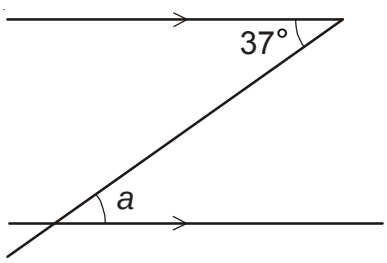


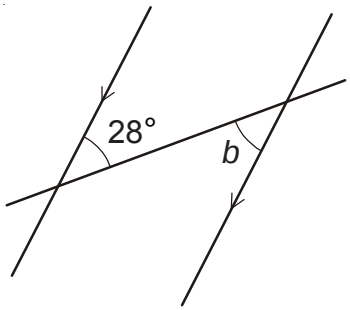


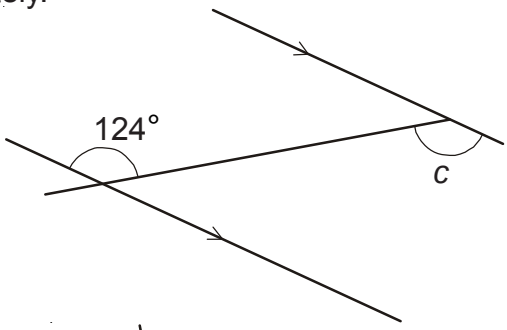
G18 Angles and Parallel Lines

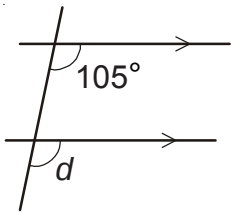
In every question below, calculate the missing angles indicated by the letters. None of the diagrams are drawn accurately.

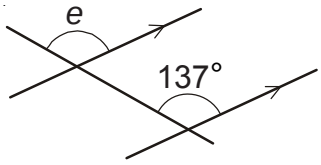
1)

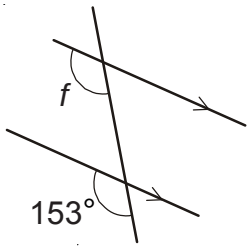




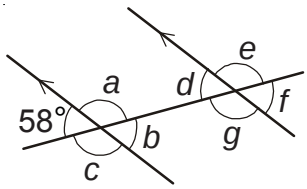


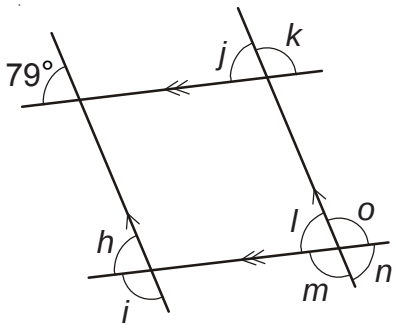


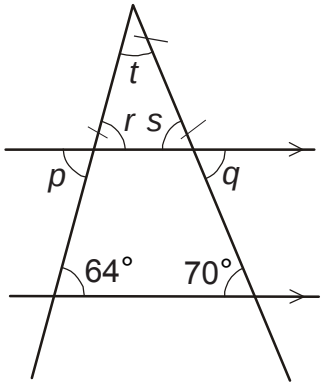




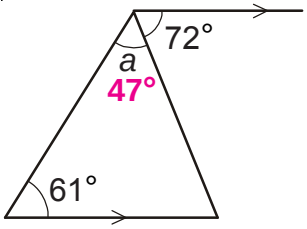
2)

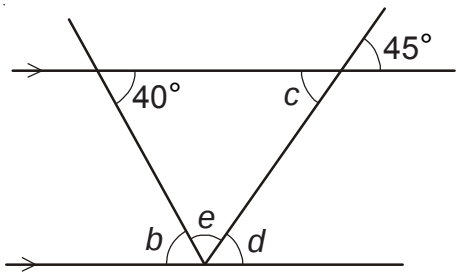




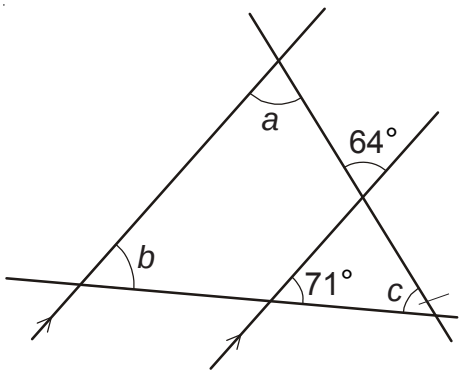


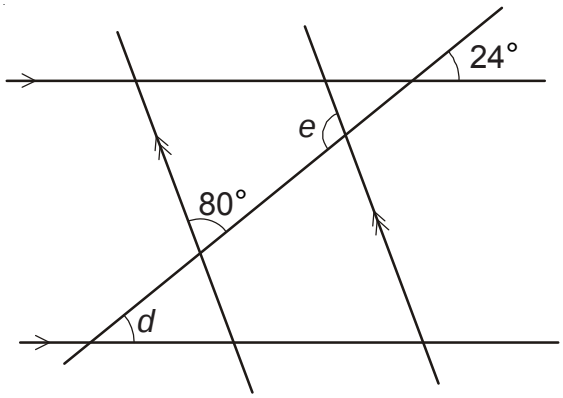
3)





4)





G19 Angle Sum of Polygons

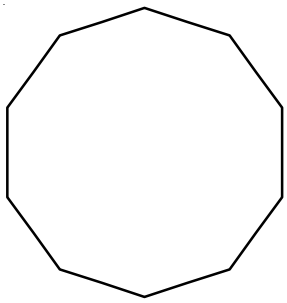
1) Find the sum of the interior angles of a nonagon (a 9-sided shape).

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?

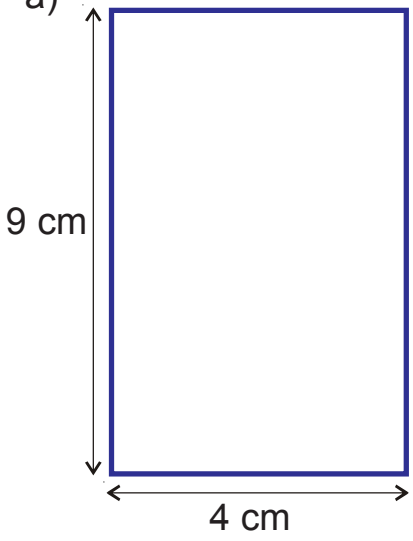
   b) What is its name?

G20a

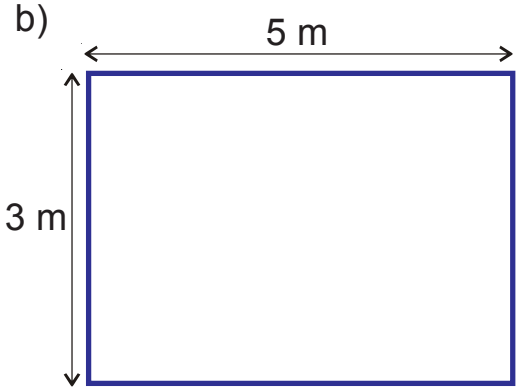
Area - Rectangles

1) Find the areas of the following four rectangles.

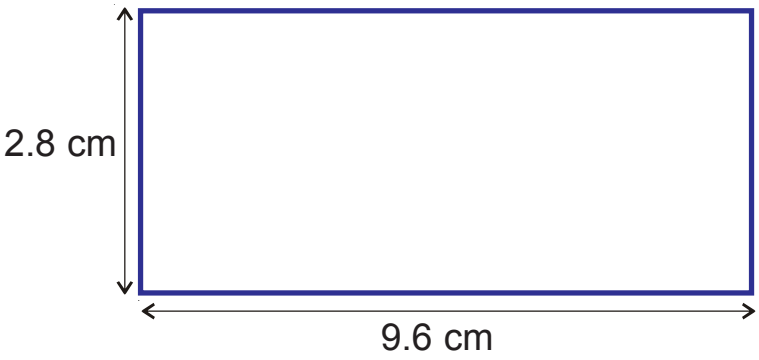
a)



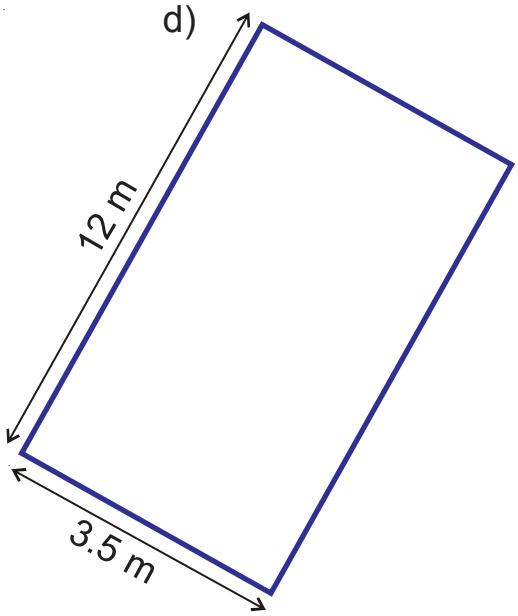
b)



c)

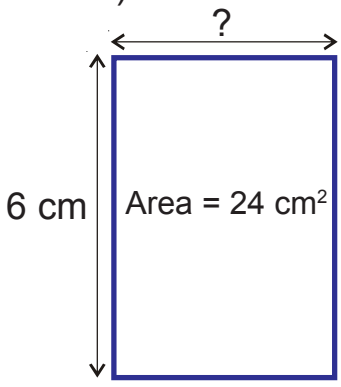


d)

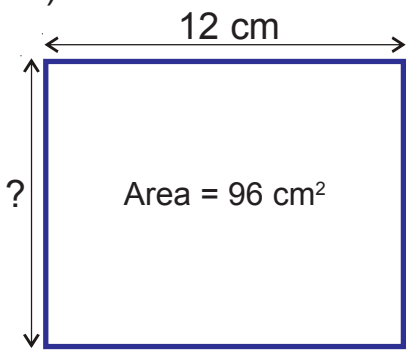


2) Find the lengths of the missing sides.

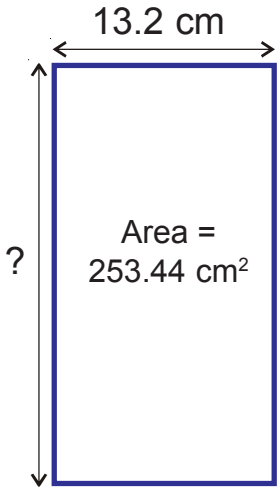
a)



b)



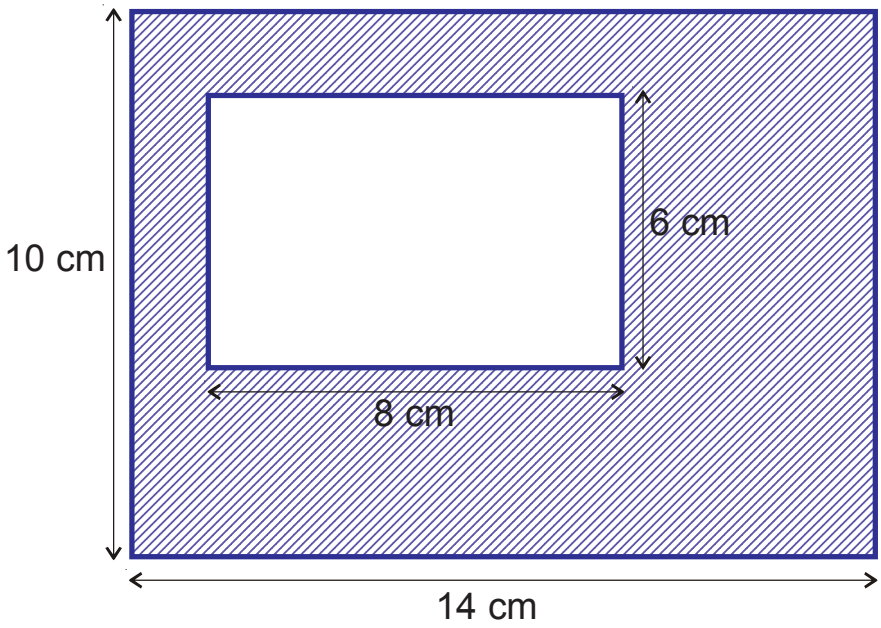
c)



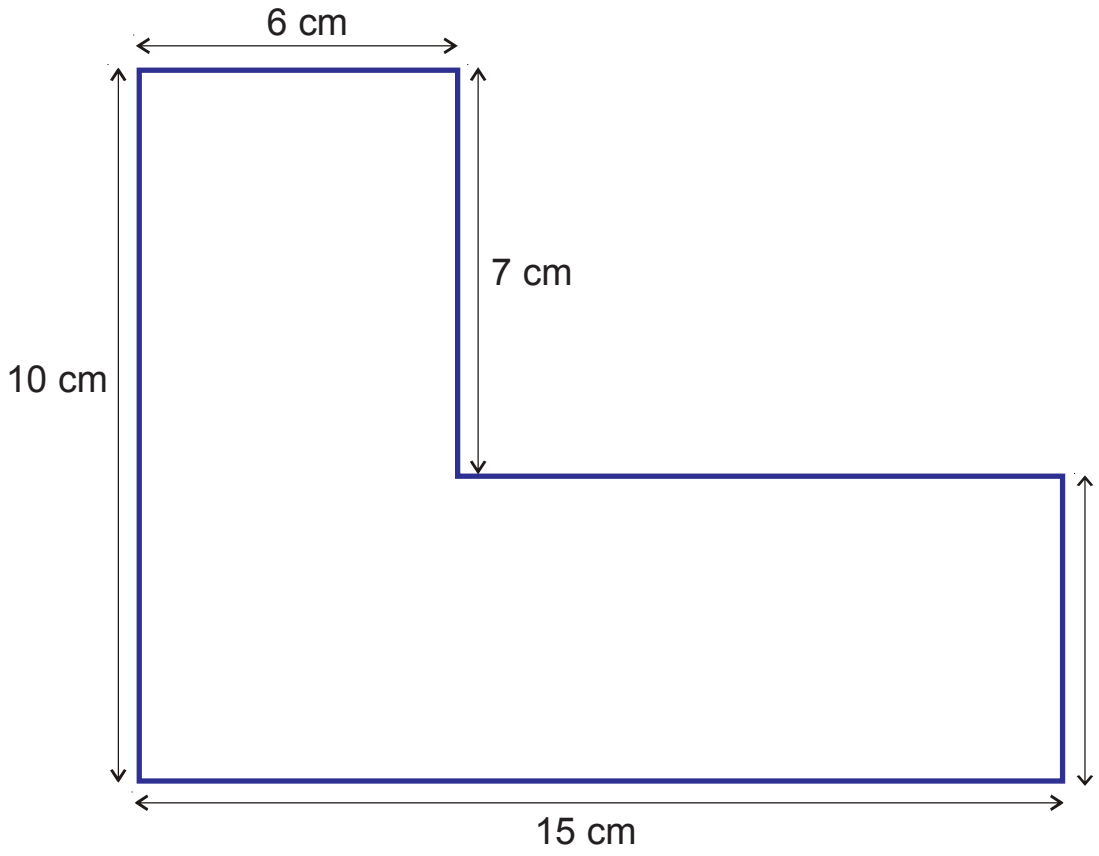
G20a

Area - Rectangles

1) Find the area of the shaded section.



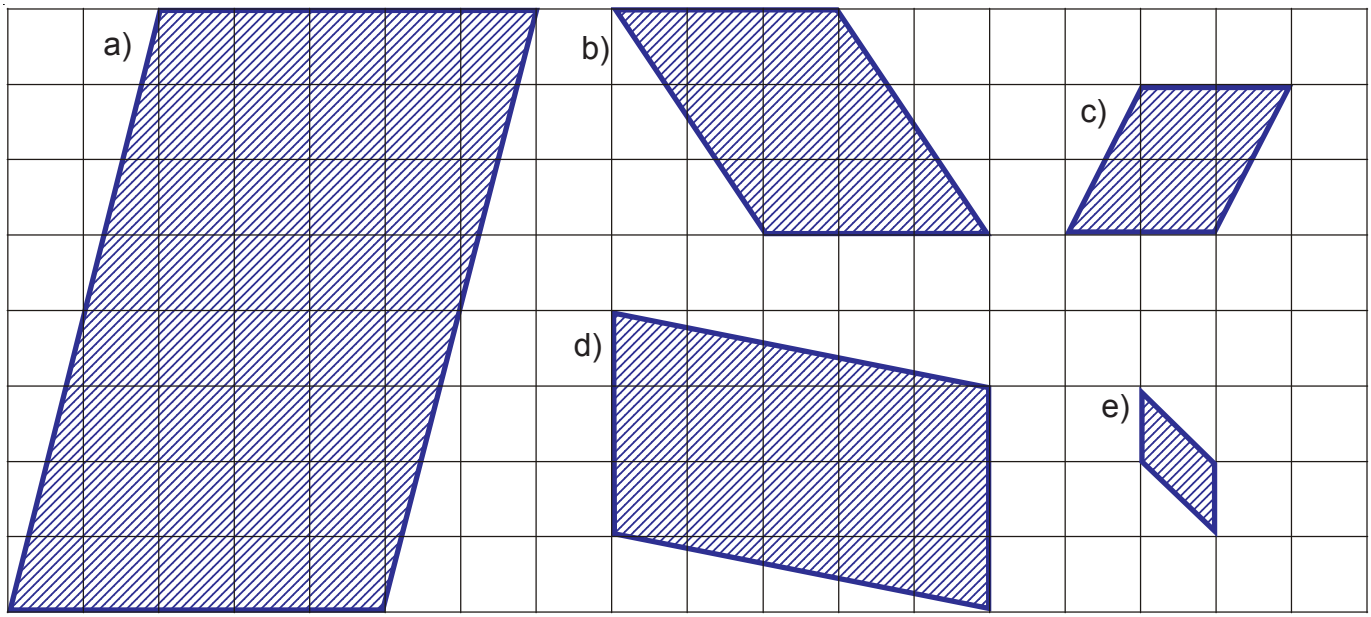
2) Find the area of the shape below.



G20b

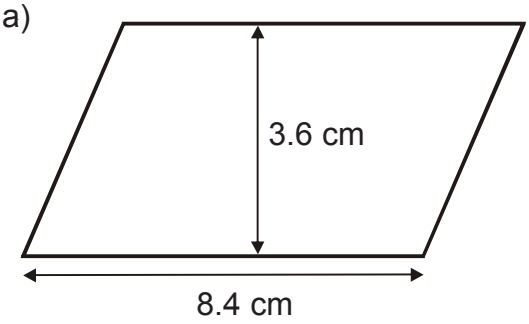
Area - Parallelograms

1) Find the areas of the five parallelograms on this cm square grid.

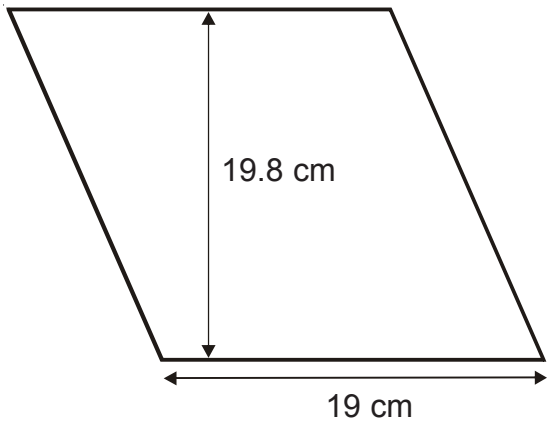


2) Find the areas of these four parallelograms

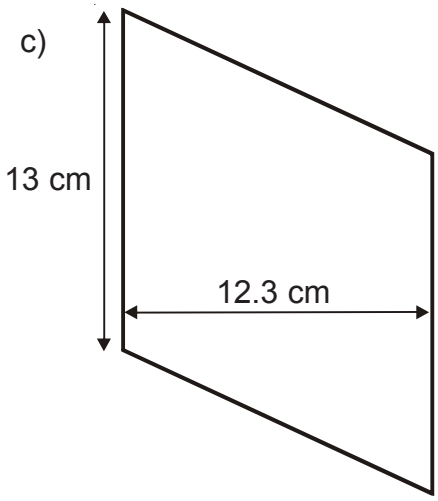
a)



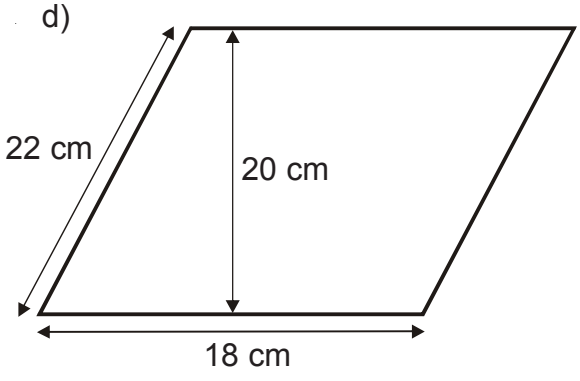
b)



c)



d)

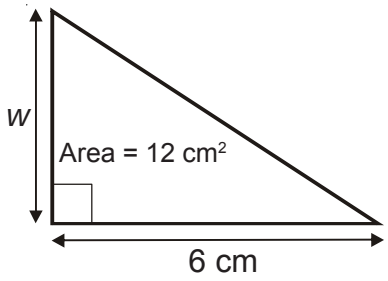


G20c

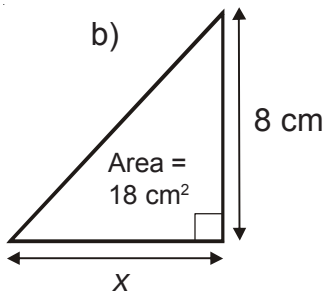
Area - Triangles

1) Find the lengths *w*, *x*, *y* and *z*

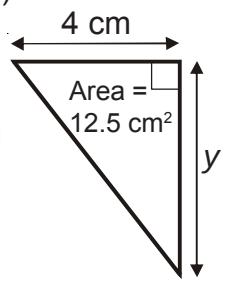
a)



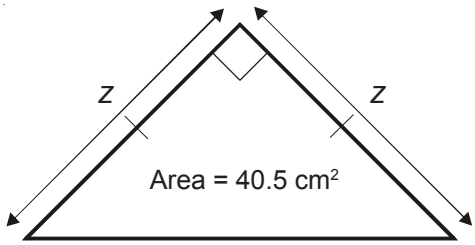
b)



c)

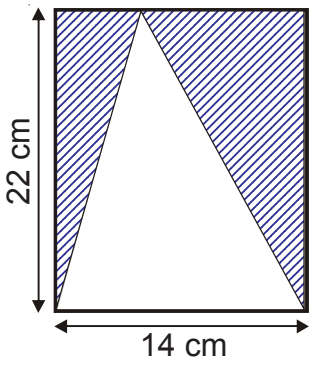


d)

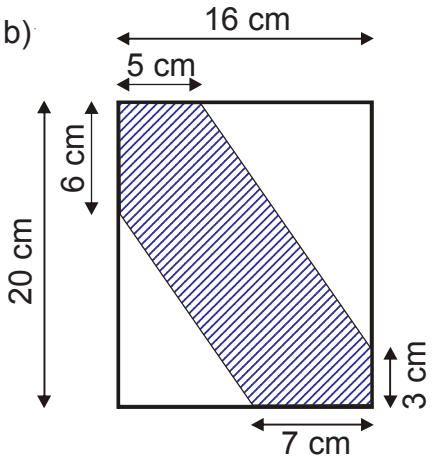


2) Find the areas of the following shaded parts of rectangles

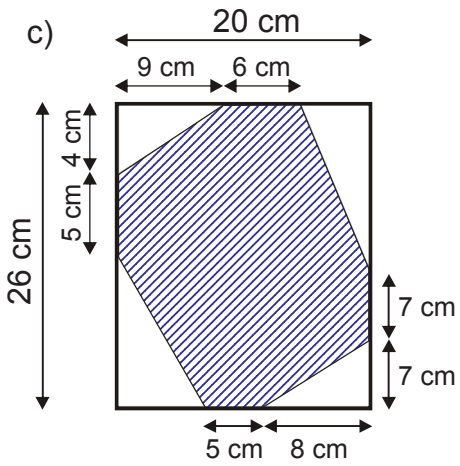
a)



b)

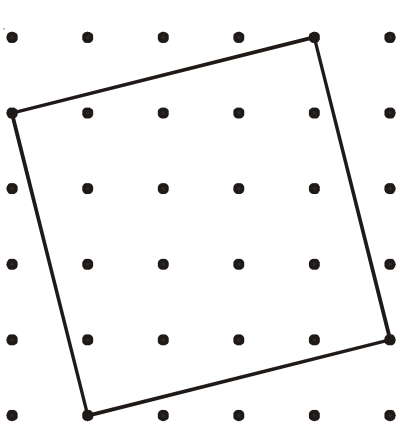


c)

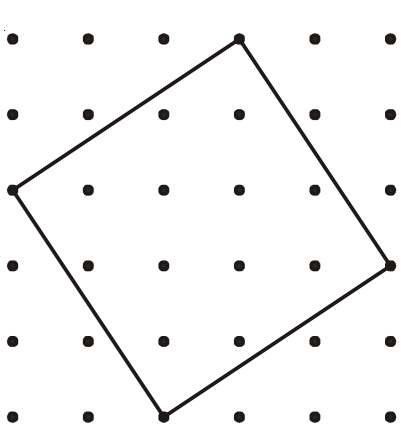


3) The two squares are drawn on 1 cm square grids.
Find the areas of the squares.

a)



b)

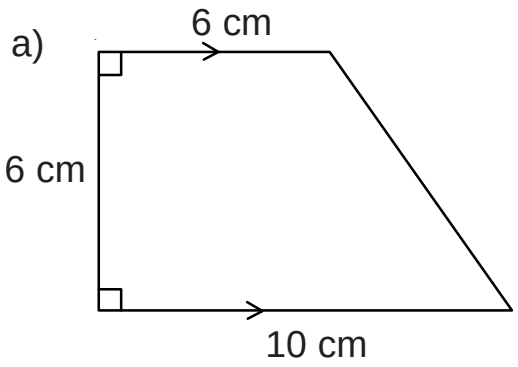


G20d

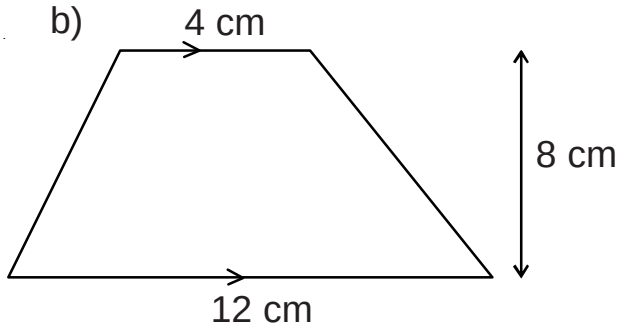
Area - Trapeziums

1) Find the area of the following trapeziums:

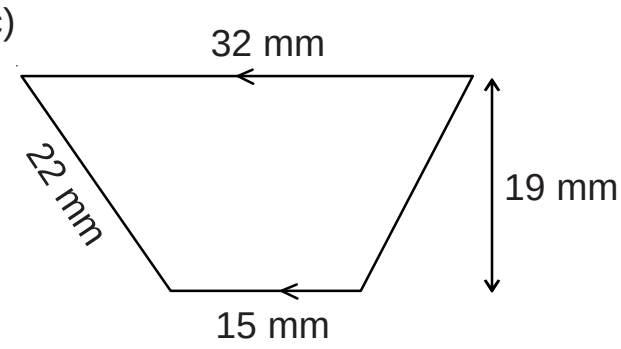
a)



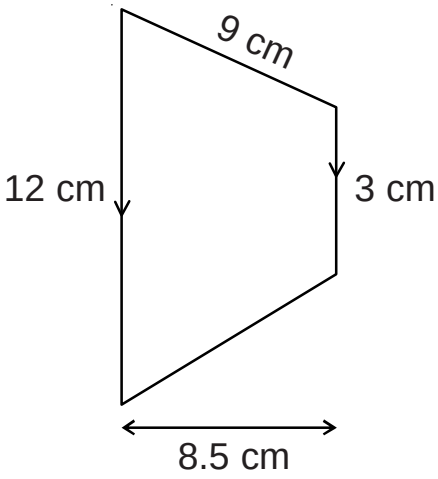
b)



c)

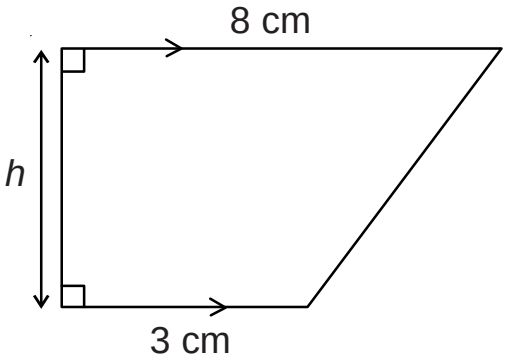


d)

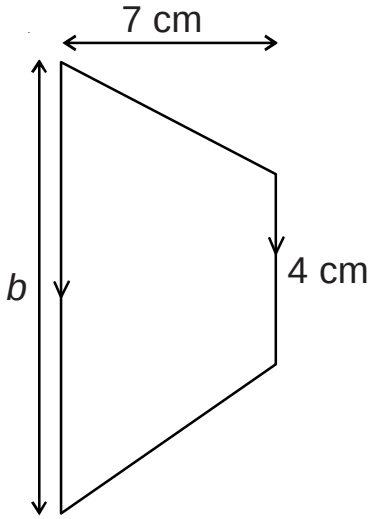


2) Find the missing lengths.

a) area = 38.5 cm^2



b) area = 59.5 cm^2

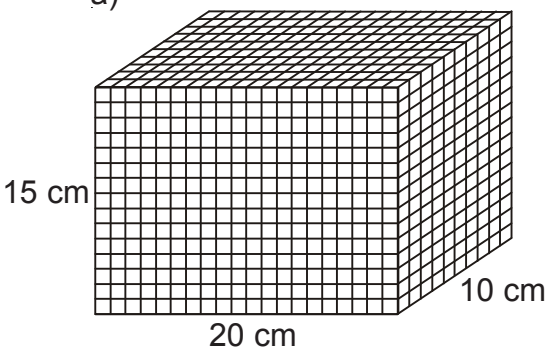


G21a

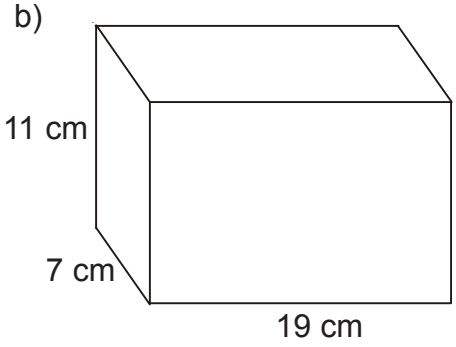
Cuboids - Volume

1) Find the volume of the following:

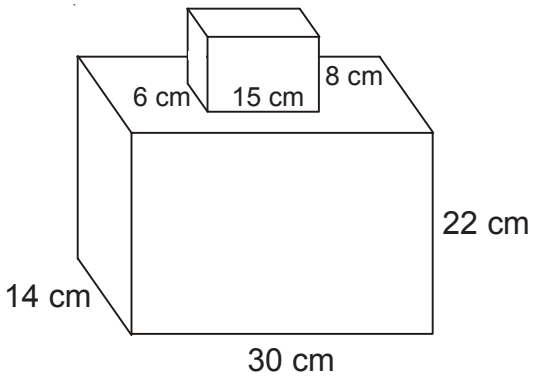
a)



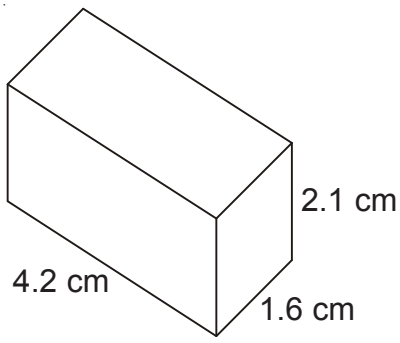
b)



c)

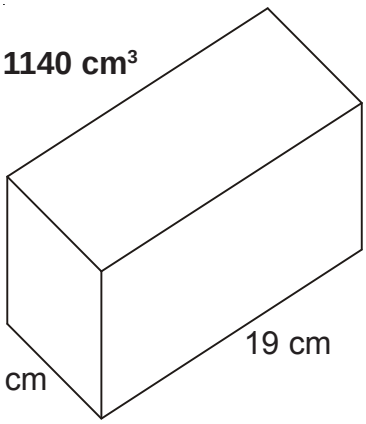


d)



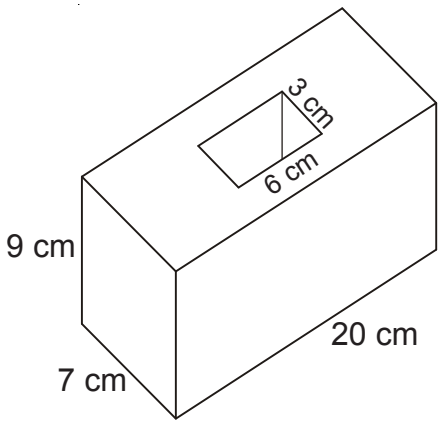
2) Find the height of this cuboid

Volume = 1140 cm³



3) The cuboid below is made out of steel and has a rectangular hole all the way through it.

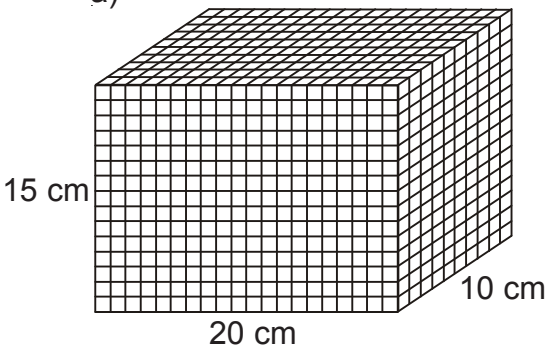
If 1 cm³ of steel has a mass of 8 g, what is the mass of the cuboid?



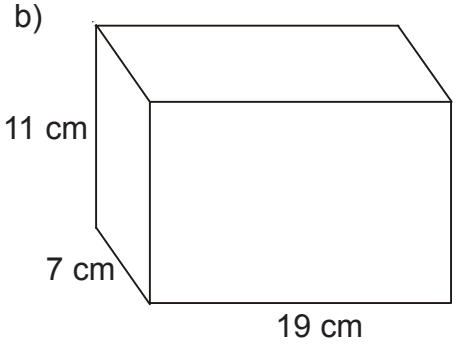
G21b Cuboids - Surface Area

1) Find the surface area of the following:

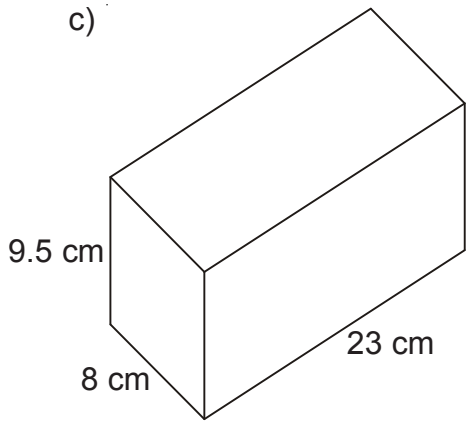
a)



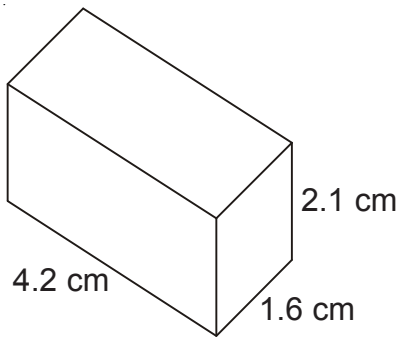
b)



c)



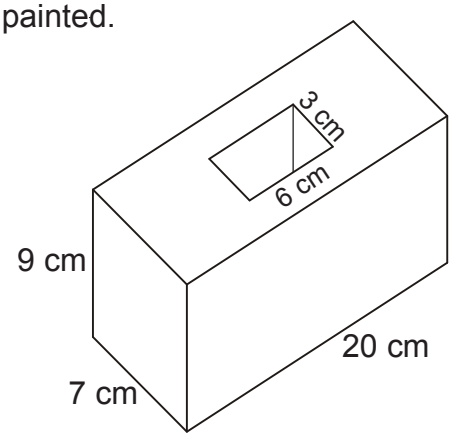
d)



2) The cuboid below is made out of steel and has a rectangular hole all the way through it.

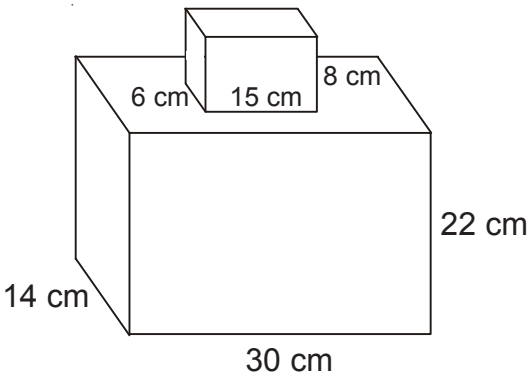
All the surfaces are painted including the base and the sides of the rectangular hole.

Work out the area which will be painted.



3) The shape below consists of a cuboid glued onto another cuboid.

If the whole shape - including the base - is painted, work out the area which will be painted.

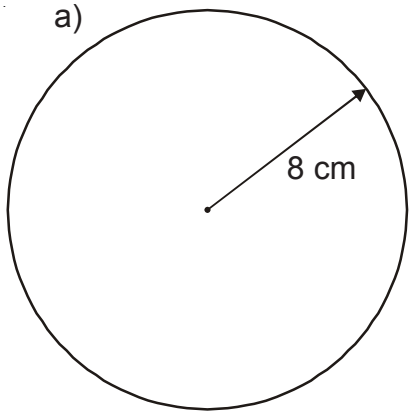


G22a Circles - Circumference

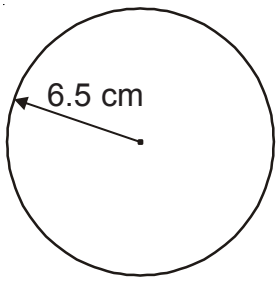
In all questions, take π to be 3.142

1) Find the circumference of the following circles

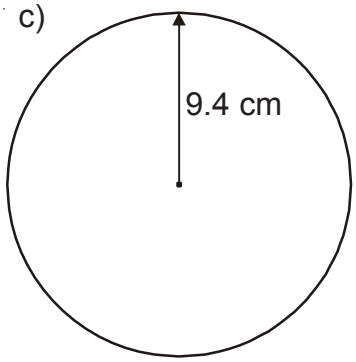
a)



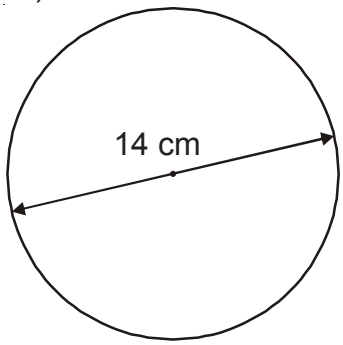
b)



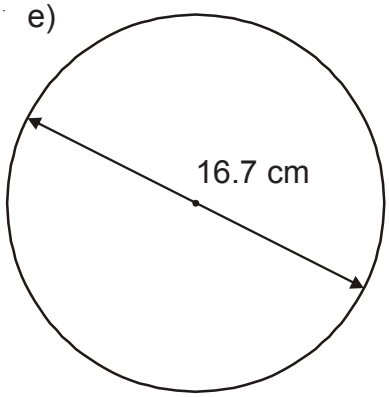
c)



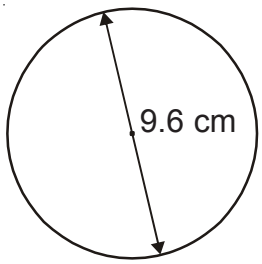
d)



e)

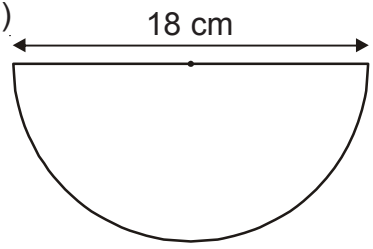


f)

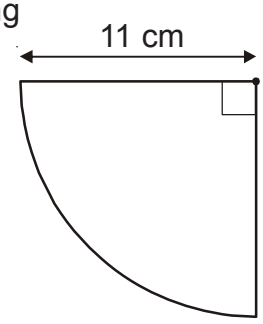


2) Find the perimeter of the following

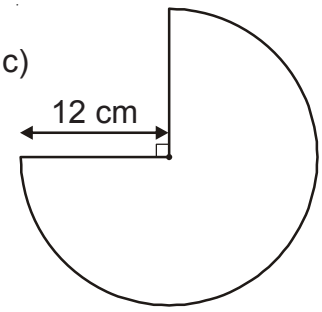
a)



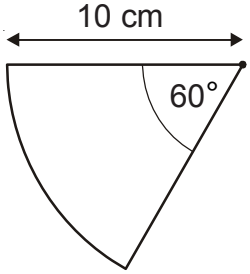
b)



c)



d)



3) The circumference of the earth is approximately 40000 km.

If you had a piece of string which was 6.3 m longer than 40000 km and put it around the earth, how far away from the earth, all the way round, would the extra 6.3 m allow it to be?

a) 0.1 mm b) 1 mm c) 1 cm d) 1 m

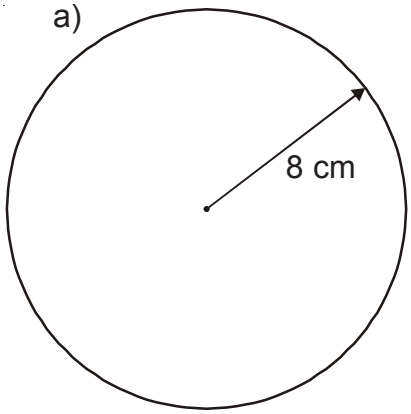
G22b

Circles - Area

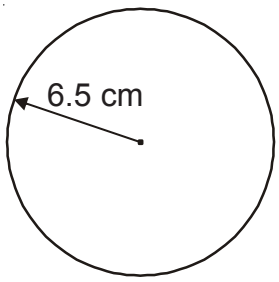
In all questions, take π to be 3.142

1) Find the areas of the following circles

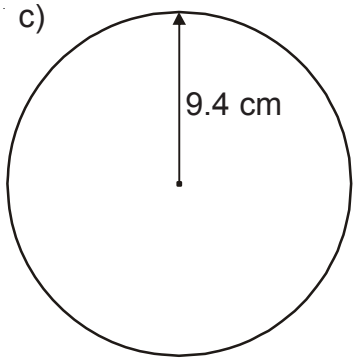
a)



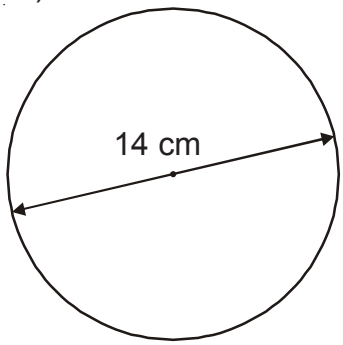
b)



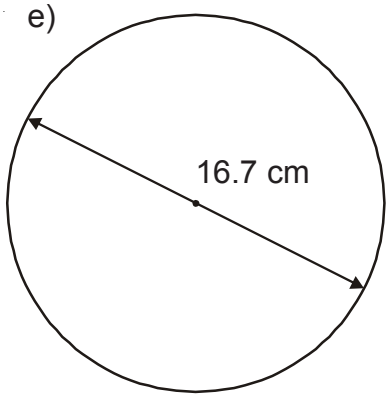
c)



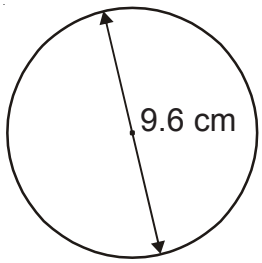
d)



e)

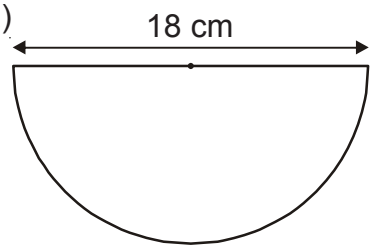


f)



2) Find the areas of the following

a)



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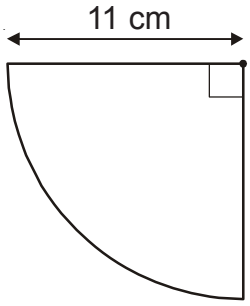

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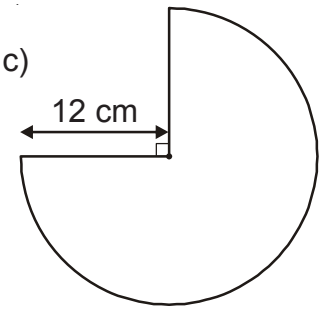

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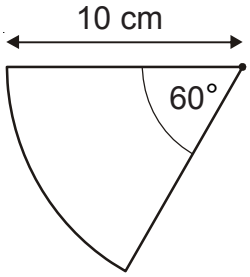

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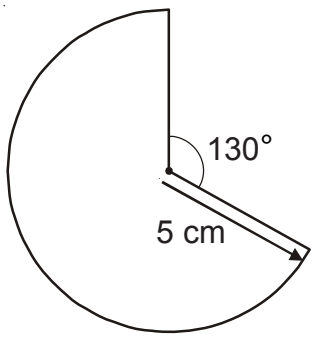


P2a Outcomes - Basics

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’.

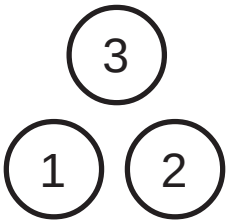
g) If you flip three coins you will get two ‘heads’ and a tail in any order.

h) If you flip three coins you will get at least one ‘head’.

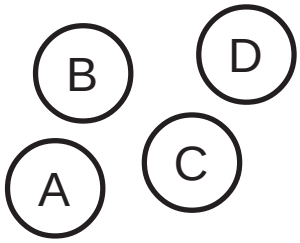
i) If you roll two dice and add the scores together you will get a total of 4.

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.

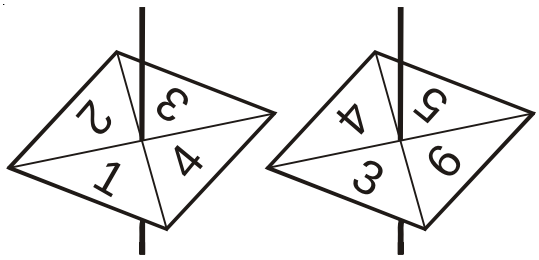
b) What is the probability that 3B will be picked?

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

P4 Two-Way Tables

1) 160 pupils in a school are asked to choose a new colour for the school tie. They can only choose from Blue, Green or Red.
Some of the results are shown in this two-way table.

	Blue	Green	Red	Total
Male	30			85
Female			14	
Total	65		42	160

Complete the two-way table.

2) A survey was done by a school to find out how people travel to the school. Altogether, 100 people were asked and the results can be seen below.

	Walk	Car	Cycle	Taxi	Bus	Total
Male pupils	12	3	6	1		
Female pupils		1	5		6	20
Male teachers		12		6		32
Female teachers	4		2	7	2	23
Total	25		19	20	12	100

a) Complete the two-way table.

b) How many people cycle to school?

c) How many female pupils go to school by taxi?

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?

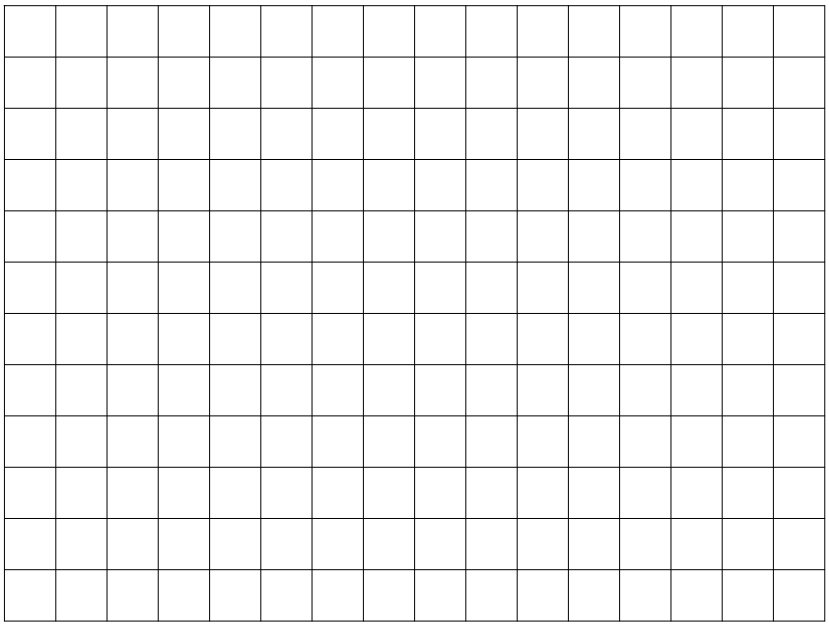
f) How many men and women lost 15 kg or more?

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.

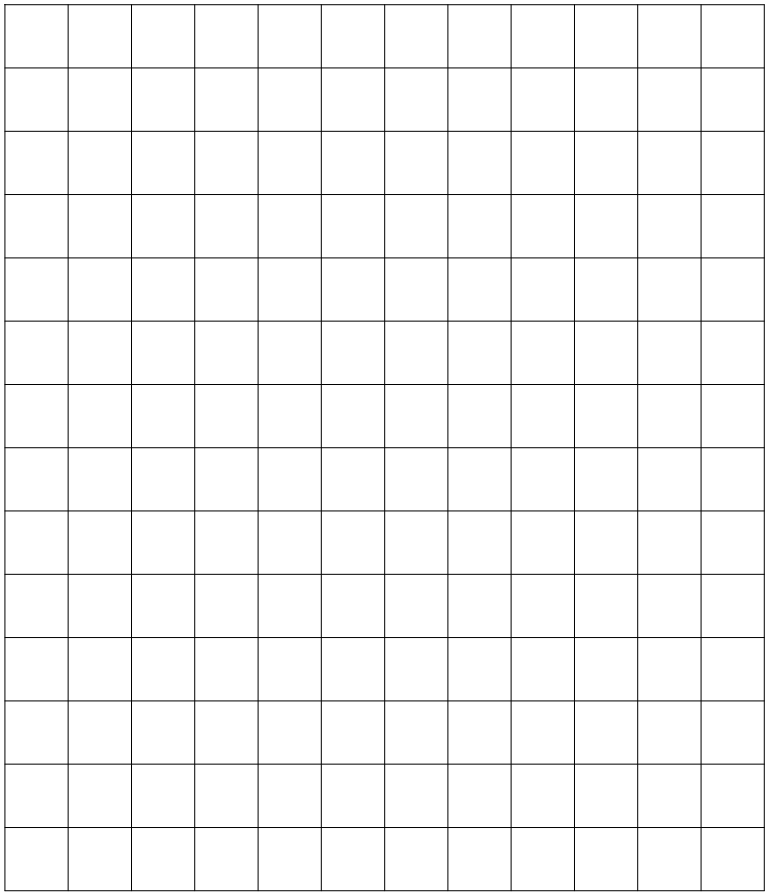
Colour	Frequency
Red	8
Blue	10
Purple	9
Green	4
Yellow	7



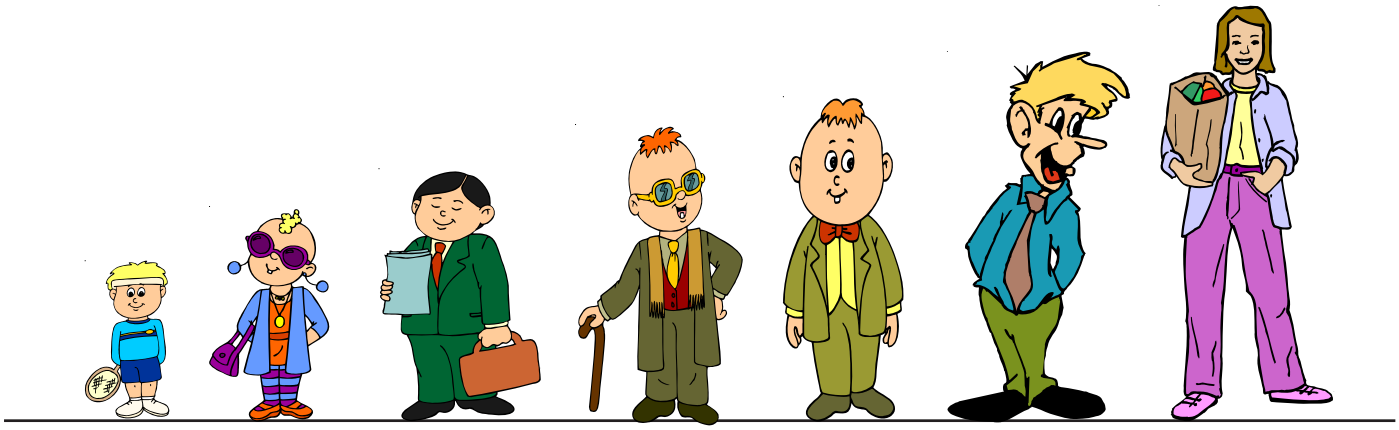
2) A group of people were given a puzzle to solve.
The time taken by each individual to complete the puzzle was recorded in the table below.

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

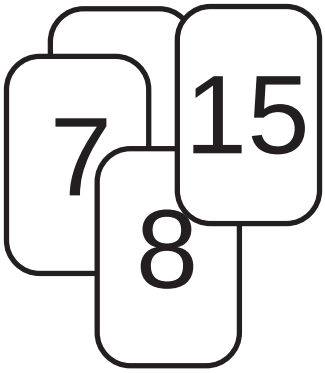
a) Find the modal height of the plants.

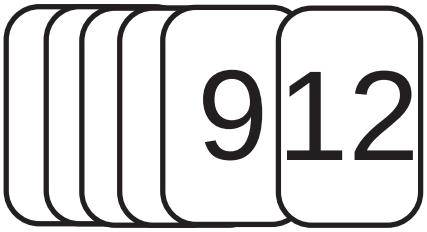
b) Find the median height of the plants.

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?

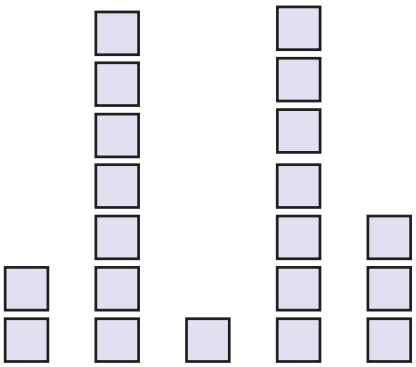
c) What is the range of Sue's scores?

Score	Frequency
1	2
2	3
3	3
4	4
5	4
6	7

S7 The Mean Average

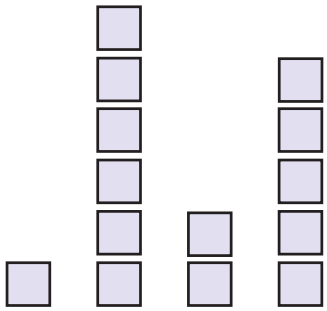
1) a) Move blocks around so that the heights of the five towers are the same.

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:

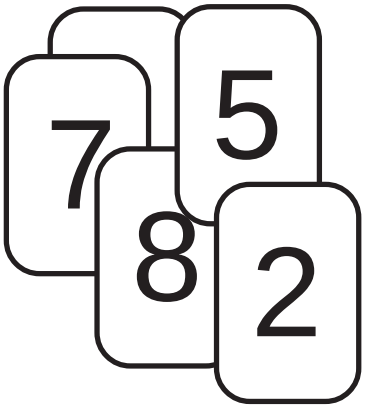
14, 12, 19, 20, 20, 15, 14, 12, 13, 3, 18, 19, 16, 14, 12, 6

Harry was in the other class and the marks were:

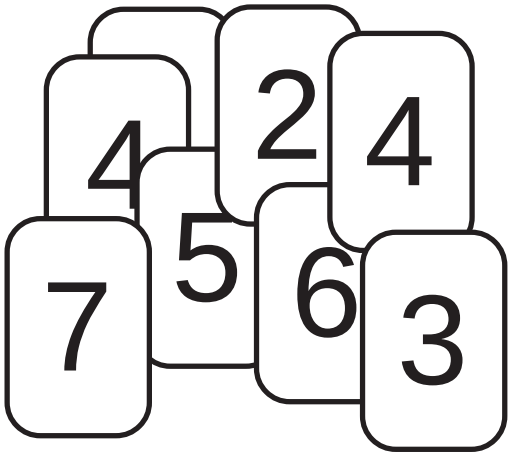
9, 12, 17, 17, 16, 14, 18, 20, 8, 13, 16, 14, 18, 8

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?