



MATHEMATICS

N3

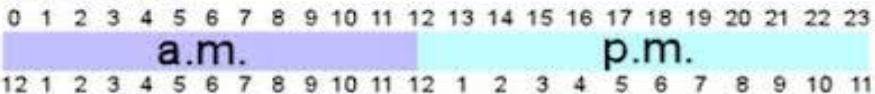
Unit 2

Shape, Space & Measures

Time

Exercise 1 – 12 and 24 Hour Time

24-hour time



12-hour time

Use this timeline to help you answer the following questions

1 Change each time to 24 hour clock time

a 5:00a.m	b 5:00p.m	c 2:00p.m
d 7:30a.m	e 9:40p.m	f 11:25a.m
g 2:20p.m	h 12:15p.m	i 10:10p.m
j 3:00p.m	k 7:30p.m	l 11:25p.m

2 Change each time to 12 hour clock time

a 05:00	b 16:00	c 02:00
d 07:30	e 13:24	f 17:05
g 15:24	h 01:45	i 06:55
j 20:10	k 22:15	l 23:32

Exercise 4 – Time Intervals

1 Work out how many hours have passed from:

a 9:00a.m to 10:00a.m	b 7:00a.m to 11:00a.m
c 11:30a.m to 1:30p.m	d 12:10p.m to 4:10p.m
e 3:15p.m to 8:15p.m	f 4:05p.m to 2:05a.m

2 Work out how many minutes have passed from:

a 9:00a.m to 9:25a.m	b 7:40a.m to 7:55a.m
c 11:30a.m to 11:45a.m	d 12:10p.m to 12:55p.m
e 3:15p.m to 3:50p.m	f 4:05p.m to 4:22p.m
g 1:10a.m to 1:38a.m	h 14:55 to 15:10
i 20:50 to 21:10	j 03:42 to 04:15
k 22:05 to 23:00	l 23:21 to 00:06

3 Work out how many hours and minutes have passed from:

a 9:00a.m to 10:30a.m	b 8:30a.m to 11:00a.m
c 10:30a.m to 11:45a.m	d 12:00p.m to 3:30p.m
e 3:15p.m to 6:45p.m	f 4:15p.m to 8:45p.m
g 1:10a.m to 6:30a.m	h 14:55 to 17:10
i 20:50 to 22:15	j 03:42 to 07:15
k 21:05 to 23:07	l 20:20 to 00:06

4 The following programmes were shown on a TV channel one evening.

6.00 pm News Report
6.30 pm Local News
6.45 pm Scenes from Soaps
7.15 pm European Football Live
10.00 pm Film – *The Curse of Pi*
11.30 pm Evening News
11.45 pm Wee Brother

a How long does 'Scenes from Soaps' last?
b Brian plans to watch 'Scenes from Soaps', European Football, and also the film. How long does he plan to spend watching television?
c Due to extra time in the football, all programmes are delayed by 30 minutes. When will 'Wee Brother' start now?

Exercise 5 – Timetables

1 Here is part of a bus timetable.

Stonehouse	0900
Larkhall	0915
Hamilton	0940

a What time does the bus leave Stonehouse?
b What time does the bus arrive at Larkhall?
c How long is the journey from Stonehouse to Larkhall?
d What time does the bus arrive in Hamilton?
e How long was the journey from Larkhall to Hamilton?

2 Here is part of a train timetable.

- a What time does the train leave Larkhall?
- b What time does the train arrive at Rutherglen?
- c How long is the journey from Larkhall to Rutherglen?
- d What time does the Train arrive in Glasgow?
- e How long was the journey from Larkhall to SECC?

<i>Larkhall</i>	1010
<i>Hamilton</i>	1017
<i>Rutherglen</i>	1031
<i>Glasgow Central</i>	1050
<i>SECC</i>	1105

3 Here is part of a train timetable.

- a What time does the train 1 leave Hamilton?
- b What time does the train 2 arrive at Partick?
- c How long is the journey from Motherwell to Hamilton?

	Train 1	Train 2
<i>Motherwell</i>	0832	1002
<i>Hamilton</i>	0842	1012
<i>Blantyre</i>	0847	???
<i>Glasgow</i>	0905	1035
<i>Partick</i>	0912	???

- d How long is the journey from Hamilton to Blantyre?
- e What time does the train2 arrive in Blantyre?
- f How long is the journey from Glasgow to Partick?
- g What time does the train2 arrive in Partick?

4 Here is part of a train timetable.

Monday to Friday					
		A	B	C	D
Glasgow	(d)	07:15	09:40	12:30	15:25
Lanark	(d)	07:45	--:--	13:00	--:--
Newcastle	(d)	09:30	10:50	15:15	16:35
Birmingham	(d)	11:40	13:00	17:25	18:45
London	(a)	13:15	14:35	18:00	20:20

a When does train C leave Glasgow ?

b Anne wants to travel from Glasgow to Newcastle.
She wants to leave Glasgow in the afternoon.
Which two trains could Anne travel on?

c When does the 09 40 train get to London?

d Frank lives in Lanark.
He wants to get a train from Lanark to Birmingham.
Which trains could he get?

e Simon arrives at Birmingham station at 17 05.
When is the next train to London?

5 Here are timetables giving information on travelling from London to Jersey and back, by train and by ferry.

London-Jersey		
20 30	dep	London (Waterloo)
21 16	dep	Basingstoke
21 42	dep	Southampton
22 25	dep	Bournemouth
23 30	arr	Weymouth Quay
00 15	dep	Weymouth Quay
05 45	arr	Jersey

Jersey-London		
Jersey	dep	23 40
Weymouth Quay	arr	05 10
Weymouth Quay	dep	05 55
Bournemouth	arr	07 00
Southampton	arr	07 43
Basingstoke	arr	08 19
London (Waterloo)	arr	09 05

Use the timetables to answer the following questions:

- a** When does the train leave London?
- b** **i)** When does the train arrive in Weymouth?
ii) When does the ferry leave Weymouth?
- c** When does the ferry arrive in Jersey?
- d** When does the ferry leave Jersey to travel to Weymouth?
- e** How long does it take for the train to travel from Bournemouth to London?

6 Here is a bus timetable for journeys between Aberdeen and Glasgow.

The timetable uses the 24 hour clock.

	A	B	C	D
Aberdeen	09 00	11 18	14 41	18 05
Dundee	10 20	12 38	16 03	19 25
Perth	10 42	13 00	16 25	19 47
Stirling	11 17	13 32	16 58	20 19
Glasgow	11 48	14 03	17 35	20 50

- a** Which buses leave Aberdeen in the morning?
- b** Which buses arrive in Glasgow after 2 pm?
- c** Which bus leaves Perth at 1.00 pm?
- d** Which bus arrives in Glasgow at twenty five to six?
- e** You get to the bus station in Perth at 10.30 am.
When is the next bus to Glasgow?
- f**
 - i**) How long does the 9 o'clock bus take to travel from Aberdeen to Glasgow?
 - ii)** How long does the last bus take to travel from Aberdeen to Glasgow?
 - iii)** Which of these two buses takes longer to complete the journey?
 - iv)** How much longer does it take?

7 a Jack is going to the theatre this Friday. The show is on Shaftesbury Avenue. He lives in Romford, and will get the train to Liverpool Street. It will take him 30 minutes to get to Shaftesbury Avenue from Liverpool Street station.

The show begins at 7.30pm.

Romford.....	1754	1758	1814	1818	1824	1828	1828	1834	1838
Chadwell Heath		1802		1822		1832			1842
Goodmayes		1804		1824		1834			1844
Seven Kings		1806		1826		1836			1846
Ilford	1802	1809	1822	1829	1832	1839		1842	1849
Manor Park.....	1805		1825		1835			1845	1852
Forest Gate	1807		1827		1837			1847	1854
Maryland.....	1809		1829		1839			1849	1856
Stratford DLR 	1812	1815	1832	1835	1842	1845	1836	1852	1859
London Liverpool St. 	1820	1823	1840	1843	1850	1853	1845	1900	1907

It takes him 15 minutes to get to Romford station.

In your jotter, plan a schedule by copying and completing the table below.

	Time
Leave home.	
Train departs Romford.	
Train arrives Liverpool St.	
Arrive at Shaftesbury Ave.	

7 b He decides to meet a friend for dinner before the show, at a restaurant near the theatre.

They will need at least an hour for dinner.

Romford.....	1708	1718	1728	1734	1738	1744	1748
Chadwell Heath	1712	1722	1732		1742		1752
Goodmayes	1714	1724	1734		1744		1754
Seven Kings	1716	1726	1736		1746		1756
Ilford	1719	1729	1739	1742	1749	1752	1759
Manor Park.....	1722	1732		1745		1755	
Forest Gate	1724	1734		1747		1757	
Maryland.....	1726	1736		1749		1759	
Stratford DLR 	1729	1739	1745	1752	1755	1802	1805
London Liverpool St. 	1737	1747	1753	1800	1803	1810	1813

Remember, it takes him 30 mins to get to Shaftesbury Ave from Liverpool St, 15 minutes to get to Romford station, and the show starts at 7.30pm.

In your jotter, plan a new schedule by copying and completing the table below.

	Time
Leave home.	
Train departs Romford.	
Train arrives Liverpool St.	
Arrive at Shaftesbury Ave.	
Meet friend.	
Leave for theatre.	

7 c It's 10pm, the show is finished and he has to get home. He doesn't want to walk back to Liverpool St, and decides to get a cab. The taxi will take about 10 mins to get there from Shaftesbury Ave. What time might he be expected home?

London Liverpool St. ☎	2205	2213	2220	2235	2250	2305
Stratford DLR ☎	2212	2220	2227	2242	2257	2312
Maryland.....	2214		2229	2244	2259	2314
Forest Gate	2216		2231	2246	2301	2316
Manor Park.....	2218		2233	2248	2303	2318
Ilford	2221		2236	2251	2306	2321
Seven Kings	2223		2238	2253	2308	2323
Goodmayes	2225		2240	2255	2310	2325
Chadwell Heath	2227		2242	2257	2312	2327
Romford.....	2231	2228	2246	2301	2316	2331

Remember, it takes him 15 minutes to get home from Romford station.

In your jotter, plan a schedule for me by copying and completing the table below.

	Time
Leave the theatre.	
Arrive at Liverpool St.	
Train departs Liverpool St.	
Train arrives Romford.	
Arrive home.	

Exercise 6 – Time Problems

- 1 Milly had an appointment at Dr. Smith's office yesterday at 11:30 a.m. The doctor called her into his office right on time. She was out of there 25 minutes later. What time did Milly leave the doctor's office?
- 2 Hassan stopped at Ella's Soup and Salad for lunch. He stayed there until he had to leave to meet his friend, William, at the library. They were meeting at 1:30 p.m. The library is a 20-minute walk from Ella's. What time did Hassan have to leave the restaurant in order to get to the library right on time?
- 3 Bethany and Joe are going to march in the big city parade on Saturday. They have to be at the parade an hour before it starts. The parade kicks off at 11 a.m. If it takes 25 minutes to walk to the starting point of the parade, what time will Bethany and Joe have to leave home in order to be there right on time?
- 4 Rory, the owner of Rory's Cookie Jar, has to bake 12 large pans of chocolate chip cookies before he leaves for the day. He can bake two pans of cookies at a time. Rory knows that for perfect cookies each pan must bake for 15 minutes -- no more, no less. If he starts baking at 5:45 p.m., what is the earliest he can close up shop?
- 5 James has a busy day planned today. He will meet his friend, Ben, at the skate park. That is a 15-minute walk from home. They will stay at the skate park for an hour. Then they will take a 10-minute walk over to the shops. The first thing they will do there is to grab a hot dog from Brittany's Burger Bar. If James left home at 10:00 a.m., what time did he and Ben get in line for a hot dog?

6 Class 4 were doing a writing assessment and the children were allowed 45 minutes to write a short story. If the test started at 11.10 a.m., what time did it finish?

7 It takes 15 minutes to walk to St Lawrence Church. Father Michael has asked us to be there at 10.20 a.m. At what time must we leave school?

8 On Wednesday, Mark arrived for P.E. at 2.12 p.m. He wants everyone to be changed in 10 minutes. At what time should the children be ready to go outside?

9 It takes Mrs Jones 18 minutes to drive to school. If she leaves home at 7.40 a.m. at what time will she arrive?

10 Last Wednesday, the road was flooded and Mrs Jonest was delayed by 10 minutes. If she left home at 7.45 a.m. when did she reach school.

11 Sandra runs the after school club from 3.15p.m. until 6.p.m. how long is the club open each day?

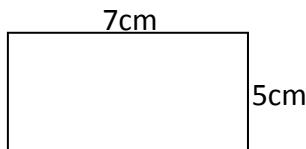
12 It takes 10 minutes to drive to Southam. Mrs Privett left school at 1.15p.m. and drove to Southam. She spent 35 minutes shopping and then drove straight back. At what time did she get back to school?

Perimeter

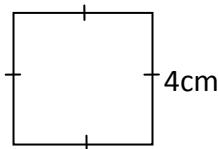
Exercise 1

1 Find the perimeter of each shape:

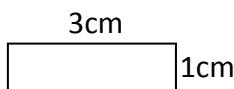
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b)



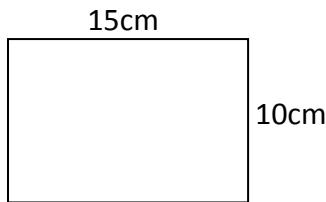
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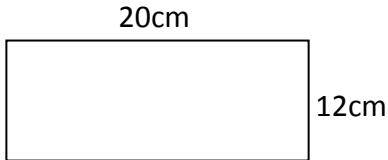
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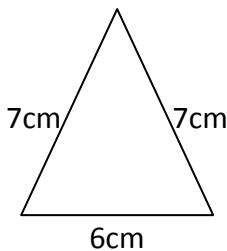
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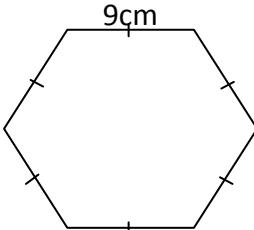
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g)

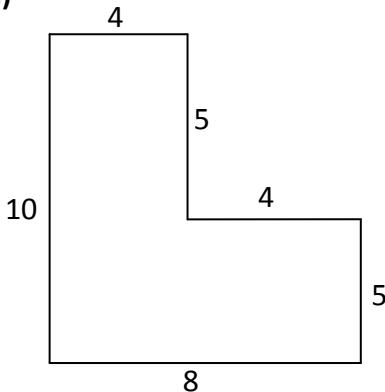


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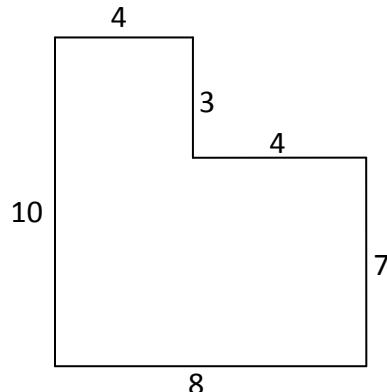


2 Work out the area of these shapes (lengths are in metres)

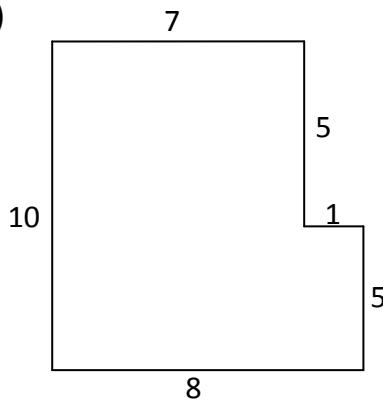
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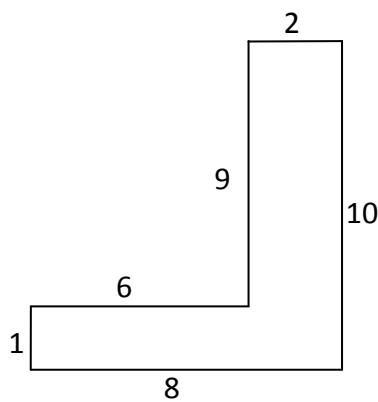
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c)

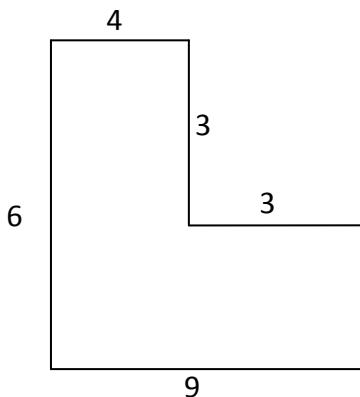


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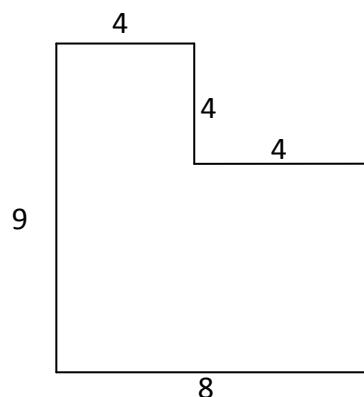


3 Work out the area of these shapes (lengths are in cm).
Watch out! You are missing a side (or two)!

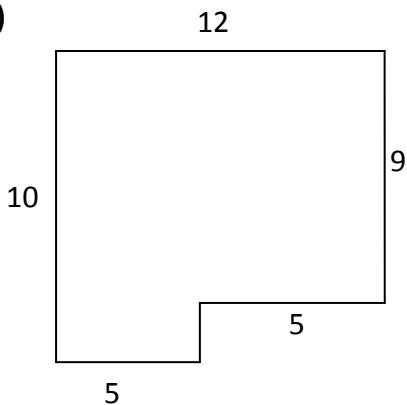
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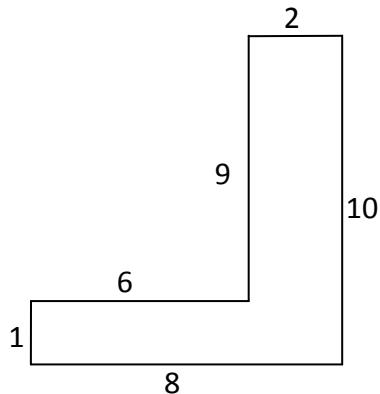
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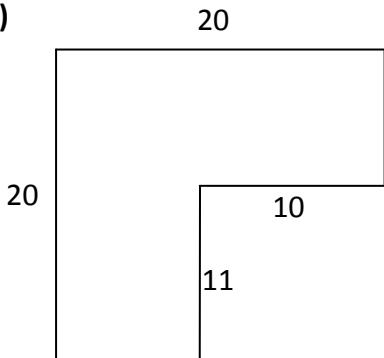
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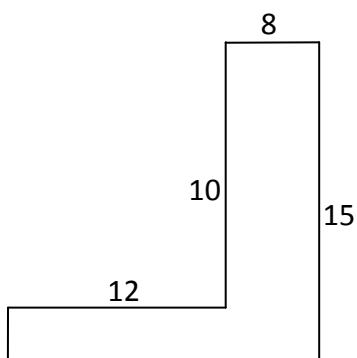
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e)



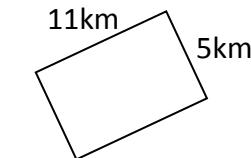
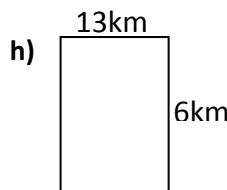
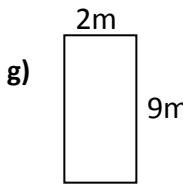
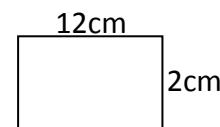
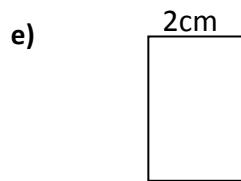
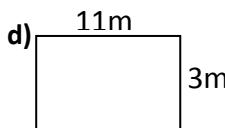
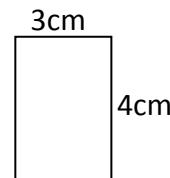
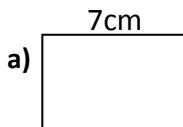
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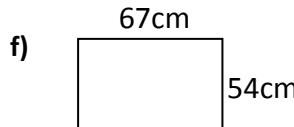
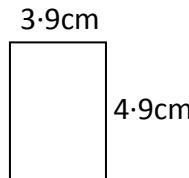
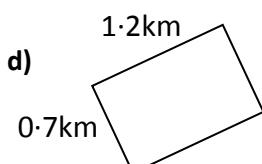
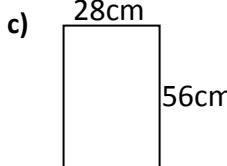
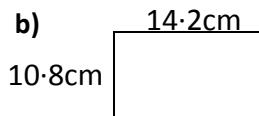
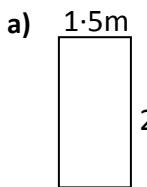
Area

Exercise 1 (remember to include units in your answers – cm^2 , m^2 , km^2)

1) Work out the area of the following rectangles (no calculator)



2) Work out the area of these rectangles (calculator)



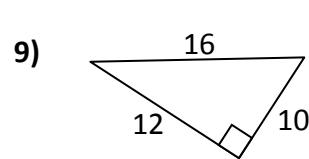
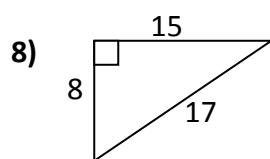
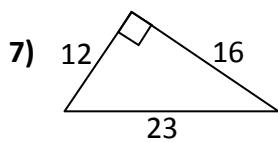
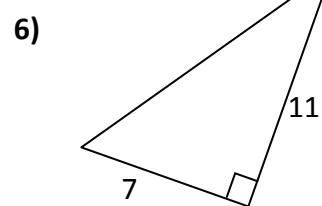
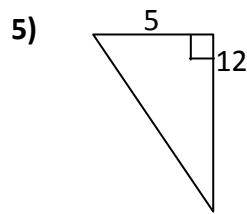
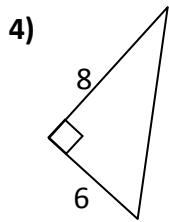
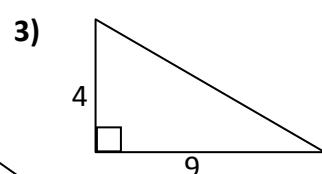
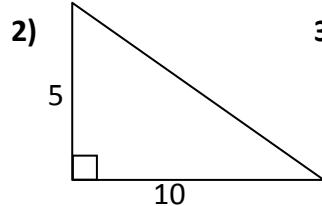
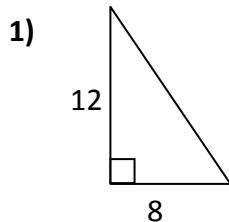
Exercise 2 (remember to include units in your answer – cm^2 , m^2 , km^2)

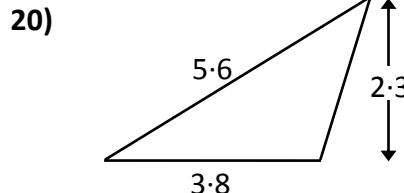
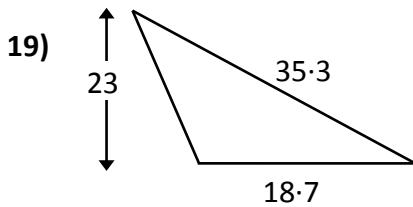
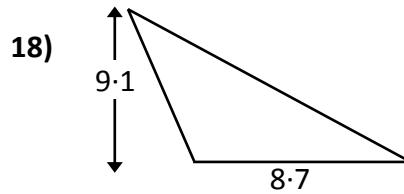
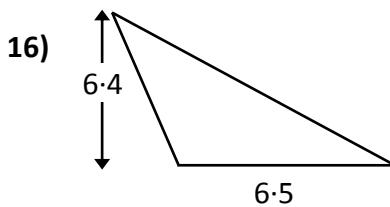
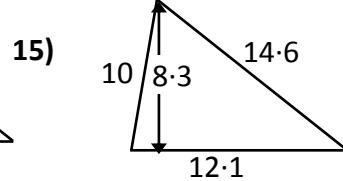
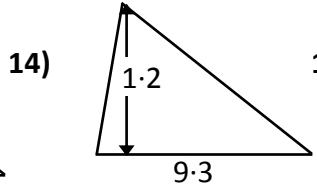
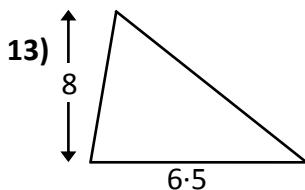
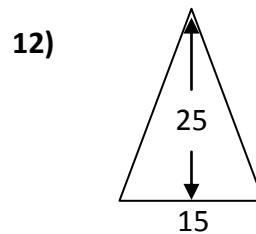
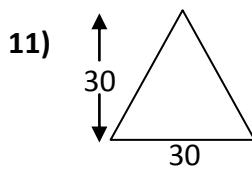
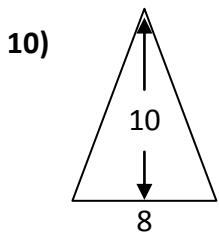
Work out the area of the following squares and rectangles
(remember to include units in your answer)

- 1) 4cm by 8cm
- 2) 9cm by 7cm
- 3) 2.5m by 2.5m
- 4) 3.6km by 5km
- 5) 24cm by 16cm
- 6) 1.25m by 1.25m
- 7) 100m by 3.2m
- 8) 4.9m by 97.2cm
- 9) 6mm by 7.2m

Exercise 3 (remember to include units in your answer: cm^2 , m^2 , km^2)

Using the rule **Area of Triangle** = $\frac{1}{2} \times \text{base} \times \text{height}$, find the area of the following triangles (all lengths are in cm)

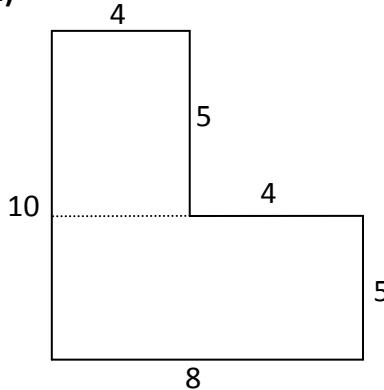




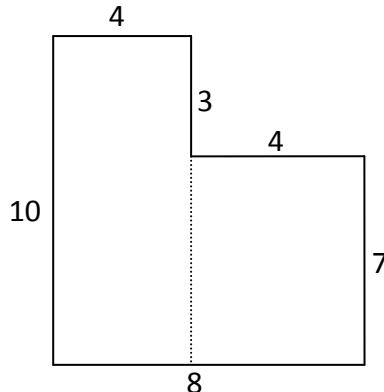
Exercise 4 (remember to include units in your answer – cm^2 , m^2 , km^2)

1) Work out the area of these shapes (lengths are in metres)

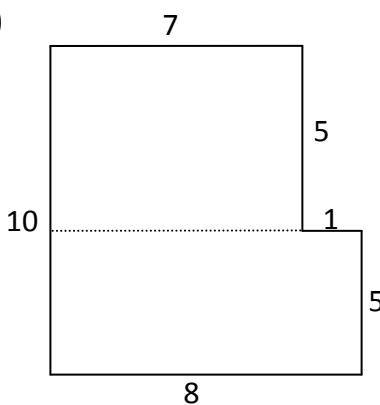
a)



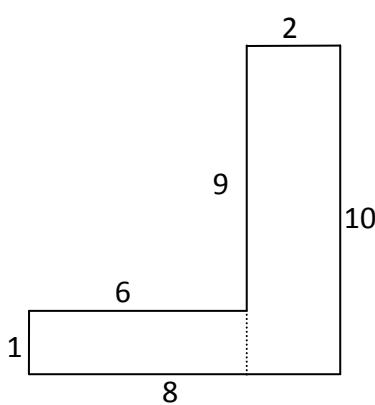
b)



c)



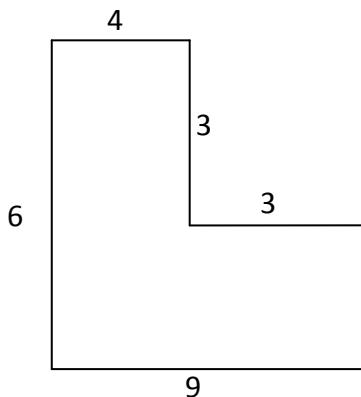
d)



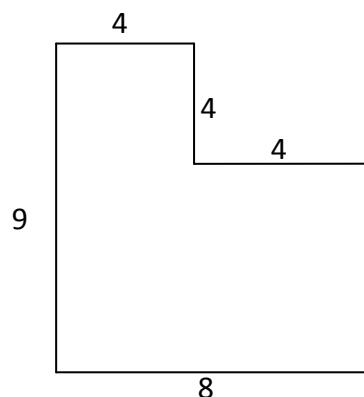
2) Work out the area of these shapes (lengths are in cm).

Watch out! You are missing a side (or two)!

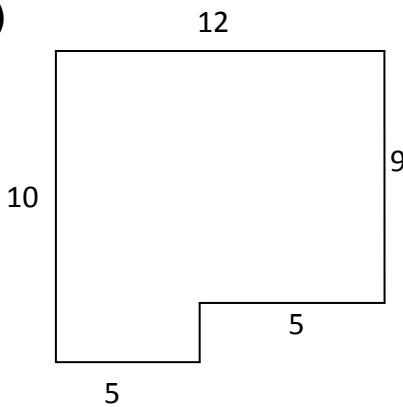
a)



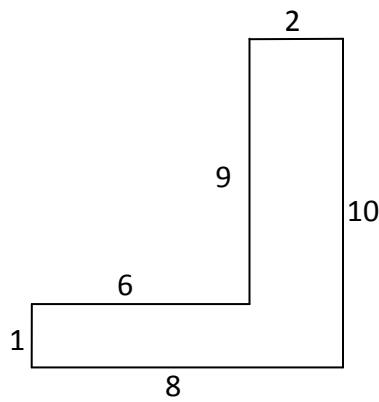
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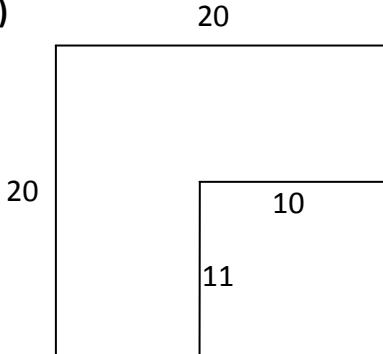
c)



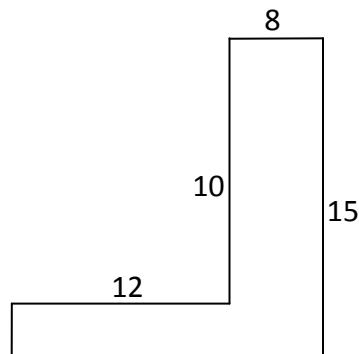
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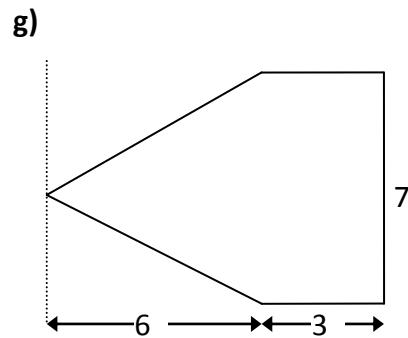
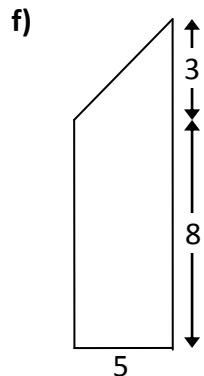
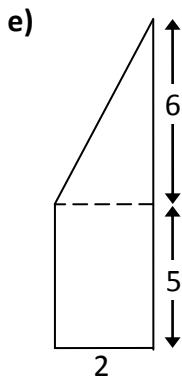
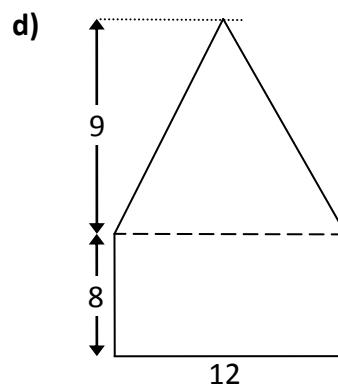
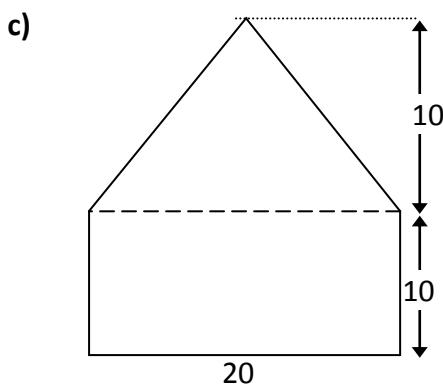
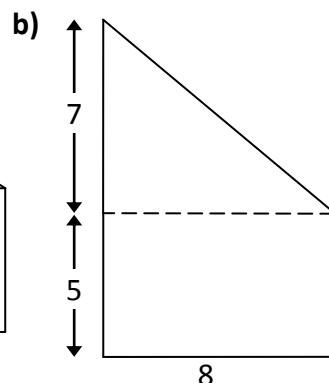
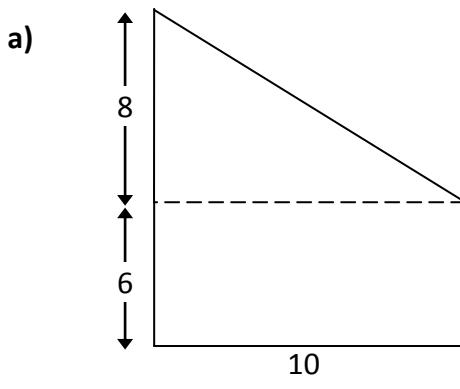
e)



f)

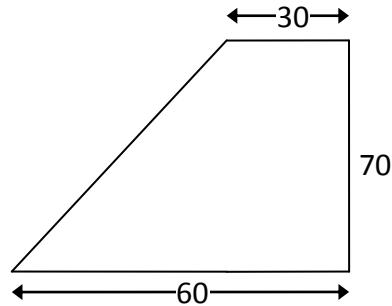
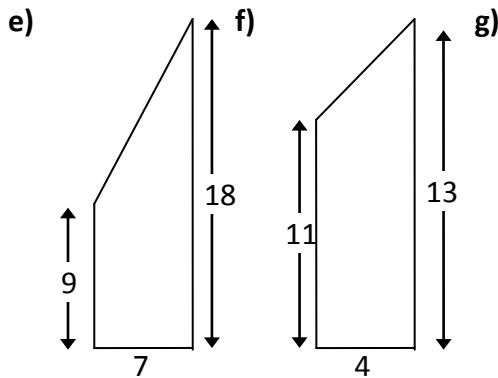
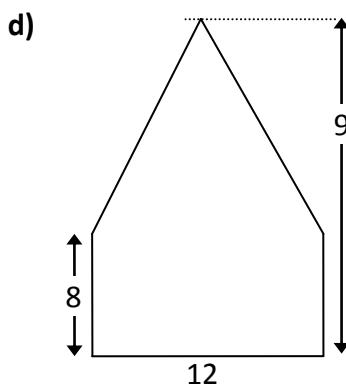
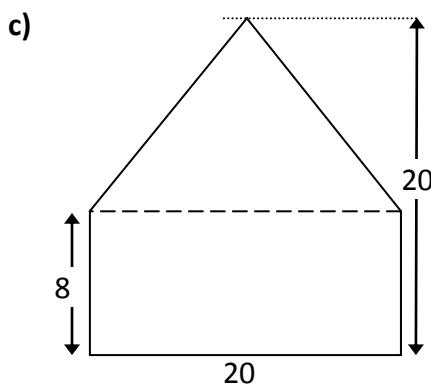
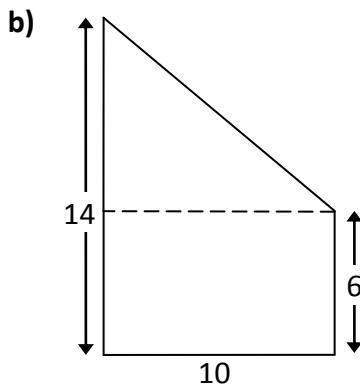
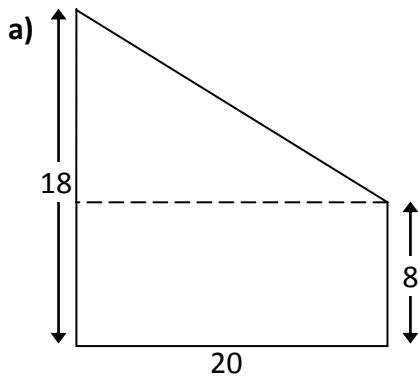


3) Work out the area of these shapes (lengths are in mm).



4) Work out the area of these shapes (lengths are in metres).

Watch out! You need to split some lengths first!

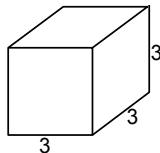


Volume

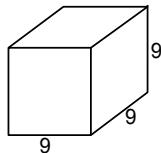
Exercise 1

Calculate the volume of these shapes (all sizes in cm).

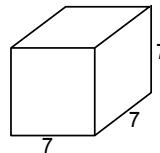
1)



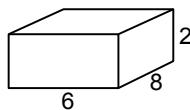
2)



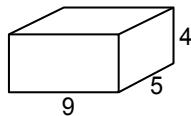
3)



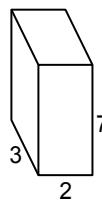
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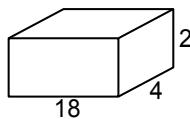
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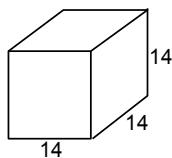
6)



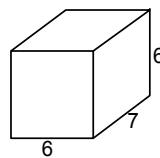
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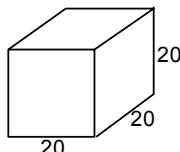
8)



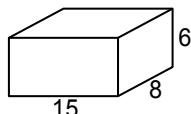
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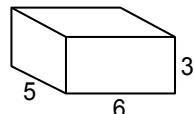
10)



11)

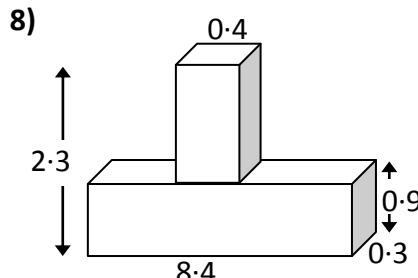
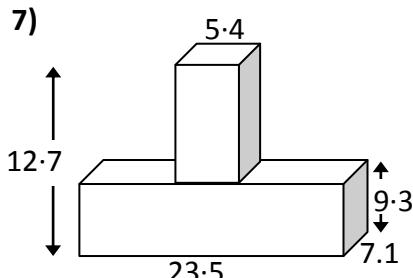
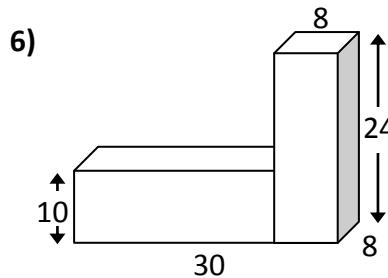
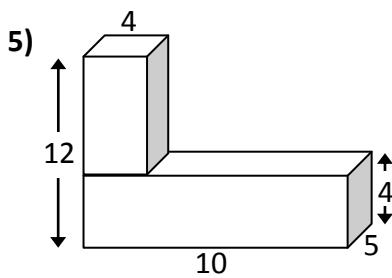
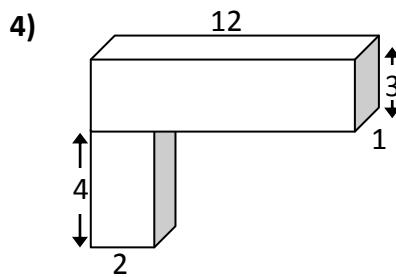
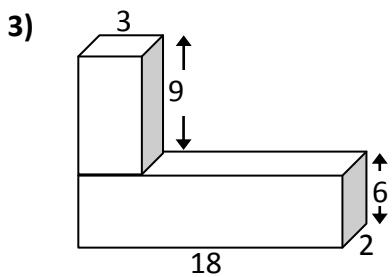
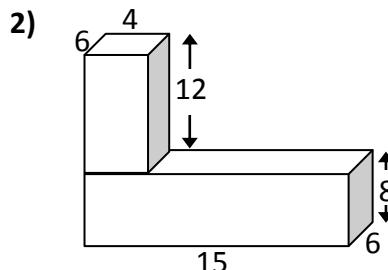
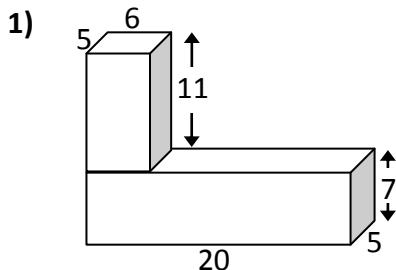


12)



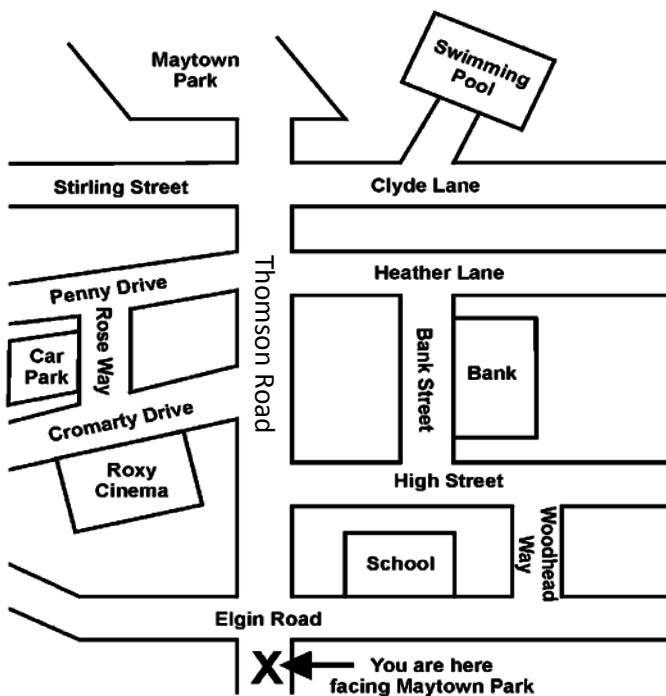
Exercise 2 (remember to include units in your answer: cm^3 , m^3 , km^3)

Work out the volume of the following cuboids (lengths are in cm)



Directions

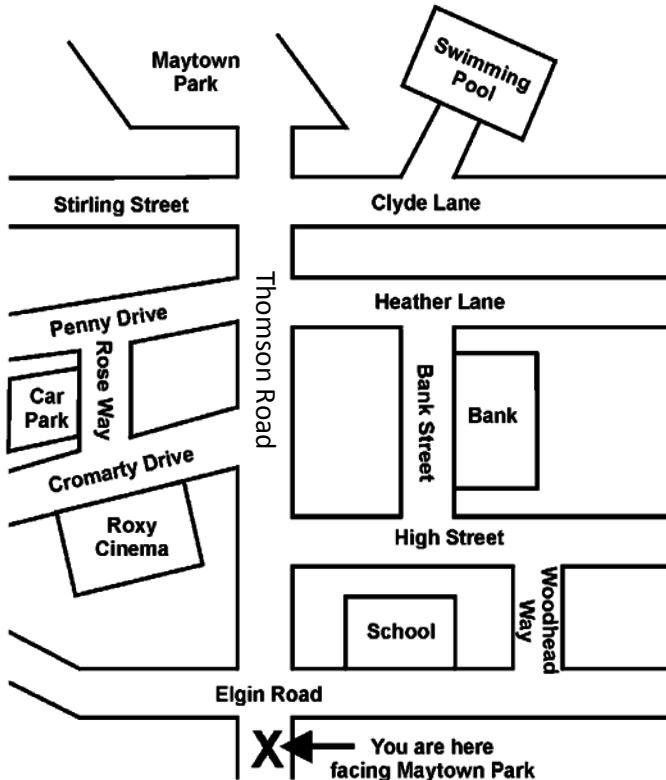
Exercise 1



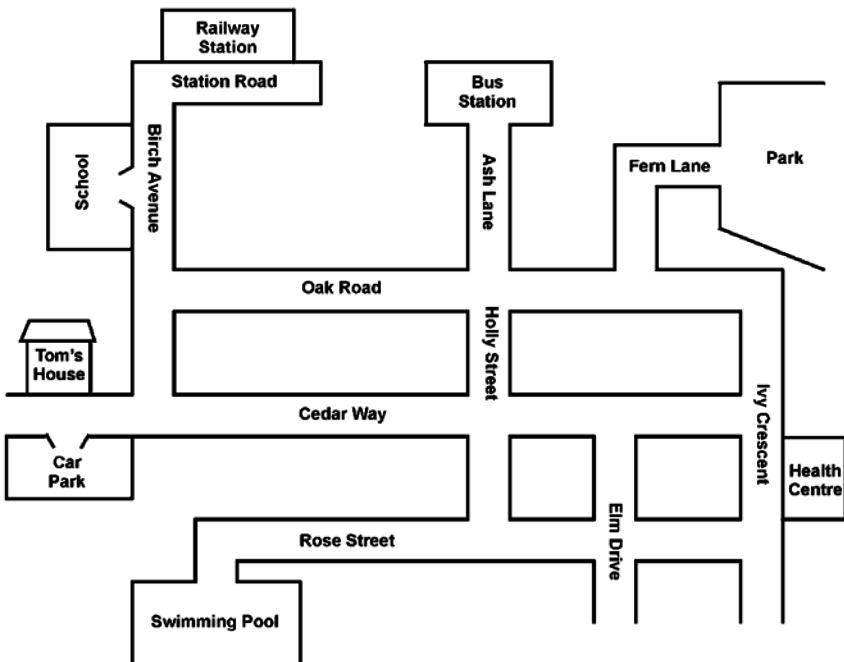
- 1 Look at the map above. Imagine you are standing at 'X'.
 - a) Which road leads to Maytown Park?
 - b) Which road is second on the left?
 - c) Which road is first on the left?
 - d) Which road is third on the right?
 - e) Which road is first on the right?
 - f) Where will you be if you take the second turning on the right and then the first on the left?
 - g) Where will you be if you take the first turning on the right and then the one on the left?
 - h) Where will you be if you take the second turning on the left and then the first on the right?

2 Look at the map below. Imagine you are at 'X'.

- a) Give directions to the bank.
- b) Give directions to the swimming pool.
- c) Give directions to the car park.
- d) Give directions to the Roxy Cinema.
- e) Give directions to the School.



3 Use the map of Newbury town centre to answer each of the following questions :



a) Jim comes out of the school gate and turns right.

He walks to the end of Birch Avenue and turns left into Cedar Way. Then he turns into the first street on the right.

What is the name of this street?

b) Anna leaves the bus station and walks down Ash Lane.

She takes the third turning on the left followed by the second turn on the right.

What street is Anna now in?

c) Tom lives in Cedar Way opposite the car park.

He works at the swimming pool.

Describe the route Tom would walk each day to get from his house to the swimming pool.

d) Robin is at the bus station.

He wants to get to the Health Centre.

Describe the route he should take from the bus station to the Health Centre.

4 Andrew arrives at the main entrance to your school and asks for directions to each of the following places. Write down the instructions you would give him.

Always start from the front door.

a) the Headteacher's office

b) the lunch room or canteen

c) the PE changing rooms

d) your Maths classroom

e) your English classroom

Number Patterns

Exercise 1

Copy these sequences into your jotter and write down the next 2 numbers

1	1, 2, 3, 4,,	2	2, 4, 6, 8,,	3	3, 5, 7, 9,,
4	1, 4, 7, 17,,	5	5, 8, 11, 14,,	6	7, 11, 15, 19,,
7	23, 22, 21, 20,,	8	19, 17, 15, 13,,	9	41, 43, 45, 47,,
10	32, 34, 36, 38,,	11	16, 19, 22, 25,,	12	17, 20, 23, 26,,
13	39, 36, 33, 30,,	14	51, 48, 45, 42,,	15	21, 25, 29, 33,,
16	52, 56, 60, 64,,	17	4, 5, 6, 7,,	18	9, 10, 11, 12,,
19	4, 6, 8, 10,,	20	6, 9, 12, 15,,	21	10, 15, 20, 25,,
22	5, 7, 9, 11,,	23	8, 11, 14, 17,,	24	21, 19, 17, 15,,
25	36, 30, 24, 18,,	26	10, 13, 16, 19,,	27	23, 19, 15, 11,,

Exercise 2

Copy these sequences into your jotter and write down the next 2 numbers

1	19, 26, 33, 40, 47,,	2	73, 62, 51, 40, 29,,
3	19, 30, 41, 52, 63,,	4	49, 41, 33, 25, 17,,
5	$\frac{1}{2}, 1, 1\frac{1}{2}, 2, 2\frac{1}{2}, \dots, \dots$	6	$8, 7\frac{1}{2}, 7, 6\frac{1}{2}, 6, \dots, \dots$
7	0.2, 0.9, 1.6, 2.3, 3.0,,	8	7.6, 6.5, 5.4, 4.3, 3.2,,
9	13, 26, 39, 52, 65,,	10	95, 80, 65, 50, 35,,
11	$\frac{1}{4}, \frac{1}{2}, \frac{3}{4}, 1, 1\frac{1}{4}, \dots, \dots$	12	$\frac{1}{2}, 2, 3\frac{1}{2}, 5, 6\frac{1}{2}, \dots, \dots$
13	1, 3, 6, 10, 15,,	14	1, 4, 9, 16, 25,,
15	2, 4, 8, 14, 22,,	16	1, 4, 10, 19, 31,,

17 4, 7, 12, 19, 28,,
19 0, 4, 12, 24, 40,,
21 41, 30, 21, 14, 9,,
23 1, 2, 4, 8, 16,,
25 3, 6, 12, 24, 48,,

18 0, 5, 15, 30, 50,,
20 22, 17, 13, 10, 8,,
22 18, 25, 31, 36, 40,,
24 1, 3, 9, 27, 81,,
26 320, 160, 80, 40, 20,,

Exercise 3

For each question:

a Copy and complete the table
b Write down the **rule** for the table

1

A	1	2	3	4	5	6		12
B	3	5	7					

2

C	1	2	3	4	5	6		10
D	2	5	8					

3

E	1	2	3	4	5	6		11
F	4	7	10					

4

G	1	2	3	4	5	6		20
H	3	7	11					

5

I	1	2	3	4	5	6		12
J	5	7	9					

6

K	1	2	3	4	5	6		10
L	2	6	10					

7

M	1	2	3	4	5	6		9
N	1	4	7					

8

P	1	2	3	4	5	6		12
Q	7	11	15					

9

R	1	2	3	4	5	6		20
S	4	9	14					

10

T	1	2	3	4	5	6		11
V	0	3	6					

11

W	1	2	3	4	5	6		13
X	8	11	14					

12

Y	1	2	3	4	5	6		10
Z	8	13	18					

Exercise 4

For each question:

- a** Copy and complete the table
- b** Write down the **formula** which works for the table

1

A	1	2	3	4	5	6	-	30
B	5	8	11				-	

2

C	1	2	3	4	5	6	-	25
D	6	8	10				-	

3

E	1	2	3	4	5	6	-	50
F	1	3	5				-	

4

G	1	2	3	4	5	6	-	100
H	1	4	7				-	

5

J	1	2	3	4	5	6	-	60
K	4	7	10				-	

6

L	1	2	3	4	5	6	-	25
M	5	9	13				-	

7

N	1	2	3	4	5	6	-	30
P	4	9	14				-	

8

Q	1	2	3	4	5	6	-	40
R	1	5	9				-	

9

S	1	2	3	4	5	6	-	35
T	7	9	11				-	

10

U	1	2	3	4	5	6	-	40
V	7	12	17				-	

11

W	1	2	3	4	5	6	-	15
X	7	11	15				-	

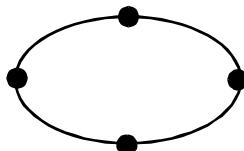
12

Y	1	2	3	4	5	6	-	50
Z	6	12	18				-	

Exercise 5

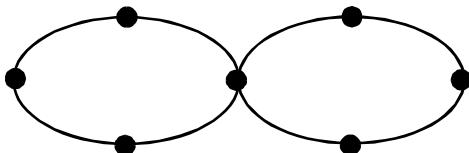
1 A manufacturer makes necklaces in various sizes.

The smallest size has a single link which is made up of **1 ring and 4 beads**.



1 ring 4 beads

The next size looks like this:



2 rings 7 beads

a Draw the next size in the sequence.
b Complete this table to show how the pattern is built up.

Number of rings	1	2	3	4	5		13
Number of	4	7					

c Write down a rule for finding the number of beads if you know the number of rings.

2 The following patterns are made using circles.



Pattern 1



Pattern 2



Pattern 3

a Draw Pattern 4

b Complete this table showing how many circles are needed for each pattern.

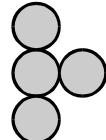
Pattern Number	1	2	3	4	5	6		12
Number of Circles								

c Write down a rule for finding the number of circles if you know the pattern number.

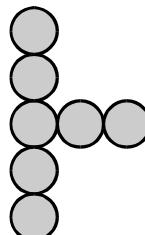
3 These patterns are made with circles.



Pattern 1



Pattern 2



Pattern 3

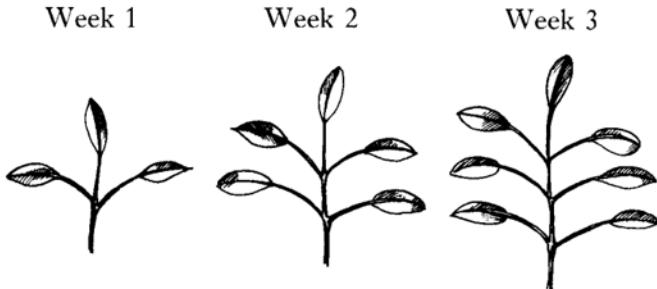
a In the space above, draw pattern 4.

b Complete the table.

Pattern number	1	2	3	4	5	6		12
Number of circles	1	4						

c Write down a rule for finding the number of circles if you know the pattern number.

4 The growth of a plant over three weeks is shown in these sketches.

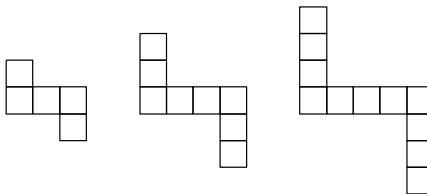


a Draw a sketch to show what the plant will look like in week 4.
b Complete the table to show the continued growth of the plant.

Week	1	2	3	4	5	6		12
Number of leaves	3	5						

c Write down a rule for finding the number of leaves on the plant if you know the number of weeks it has been growing.

5 These patterns are made with squares.

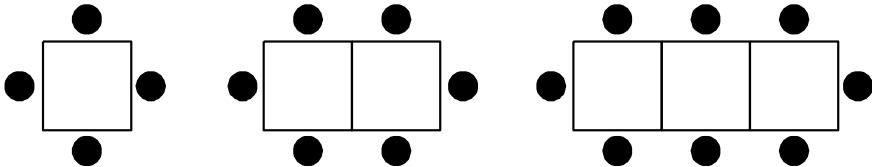


a Draw Pattern 4 in your jotter.
b Complete this table.

Pattern number	1	2	3	4	5	6		11
Number of squares								

c Write down a rule for finding the number of squares if you know the pattern number.

6 The diagrams below show the number of people sitting at desks.



a Draw the next diagram in the sequence

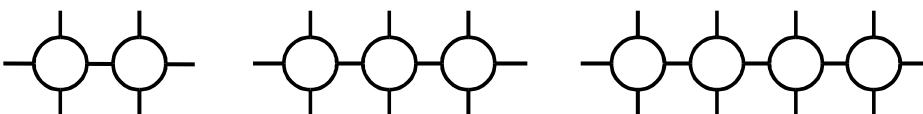
b Complete the table below for this pattern.

Number of desks	1	2	3	4	5	10	11	20
Number of people								

c Write down a rule for finding the number of people if you know the number of desks.

7 John was doodling during his art lesson and stumbled upon an interesting pattern.

The first three doodles in his pattern are shown below.



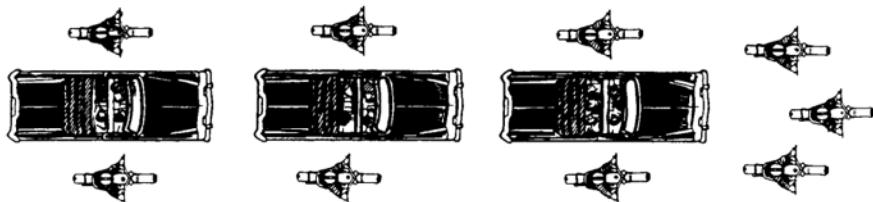
a Draw the next doodle in John's pattern.

b Complete the table below to show how many lines there would be around a particular number of circles.

Number of circles	2	3	4	5	6	7	8	9	20
Number of lines	7	10	13						

c Write down a rule describing how you would find the number of lines if you were given the number of circles.

8 When a line of cars is given a police escort, it is led by three motorbikes and each car has a motorbike on either side.

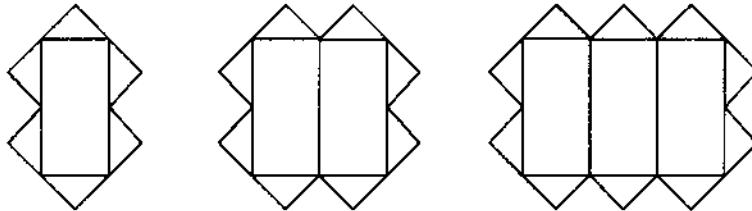


a Complete the table.

Number of cars	2	3	4	5	6		13
Number of motorbikes		9					

b Write down a rule for finding the number of motorbikes if you know the number of cars.

9 A design consists of rectangles and triangles.



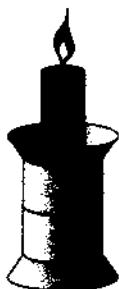
The first three patterns are shown.

a Complete this table

Number of rectangles	1	2	3	4	5	6		9
Number of triangles	6	8						

b Write down a rule for finding the number of triangles if you know the number of rectangles.

10



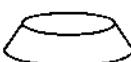
Candle holders are made up from a top, link sections and a base.



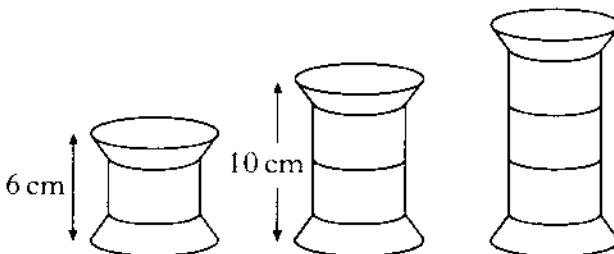
1 cm top



4 cm link section



1 cm base



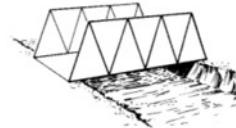
a Complete this table

Number of link sections	1	2	3	4	5	6	11
Height of candle holder (cm)	6	10					

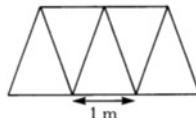
b Write down a rule for finding the height of a candle holder if you know the number of link sections.

Exercise 6

1 The sides of bridges can be made by joining together identical triangular plates, each with a base length of 1 metre.



The diagram below shows one side of a bridge 3 metres long, which needs 5 plates.



a Copy and complete the table below.

Length of bridge in metres (L)	3	4	5	6	7		20
Number of plates for one side (N)	5						

b Write down a formula for the number of plates, N , needed to make one side of a bridge of length L metres.

c Can one side of a bridge have exactly 90 plates? Explain your answer.

2 A children's play area is to be fenced.

The fence is made in sections using lengths of wood as shown.



1 section



2 sections



3 sections

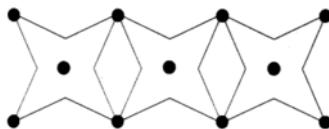
a Copy and complete the table.

Number of sections (s)	1	2	3	4	5		12
Number of lengths of wood	6	11					

b Write down a formula for calculating the number of lengths of wood (w), when you know the number of sections (s).

3 Jenni is making a wallpaper border.

She is using stars and dots to make the border.



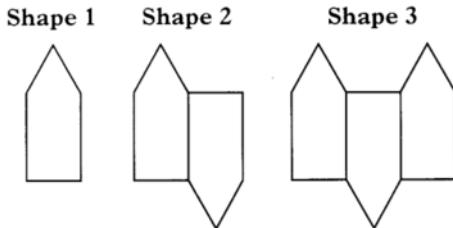
a Copy and complete the table.

Number of stars (s)	1	2	3	4	5
Number of dots (d)			11		

b Write down a formula for calculating the number of dots (d), when you know the number of stars (s).

4 Sandra is working on the design for a bracket.

She is using matches to make each shape.

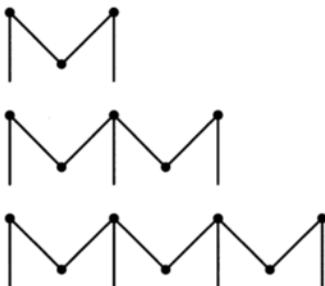


a Copy and complete the table.

Shape number (s)	1	2	3	4	5	6	13
Number of matches (m)	5	9			21		

b Find a formula for calculating the number of matches, (m), when you know the shape number, (s).

5 Mhairi makes necklaces in M-shapes using silver bars.



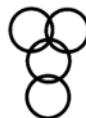
a Copy and complete the table.

Number of M-shapes	1	2	3	4		15
Number of matches (b)	4	7				

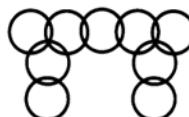
b Write down a formula for calculating the number of bars (b) when you know the number of M-shapes (m).

6 Samira is designing a chain belt.

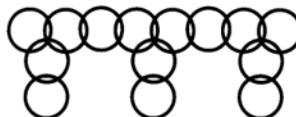
Each section of the belt is made from metal rings as shown.



1 section, 4 rings



2 sections, 9 rings



3 sections

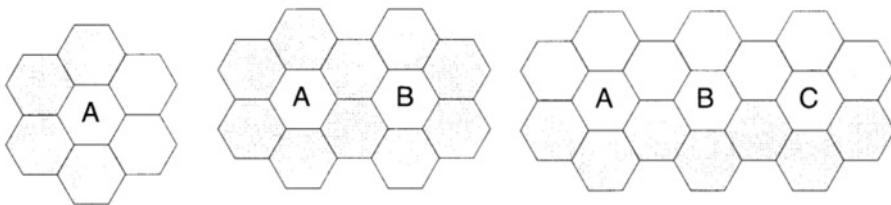
a Copy and complete the table below.

Number of sections (s)	1	2	3	4	5		11
Number of metal rings (r)	4	9					

b Write down a formula for calculating the number of rings (r) when you know the number of sections (s).

7 Carla is laying a path in a nursery school.

She is using a mixture of alphabet tiles and blank tiles.

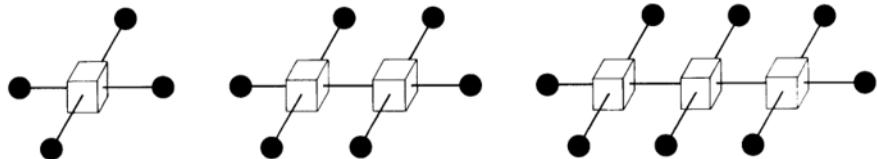


a Copy and complete the table below

Number of alphabet tiles	1	2	3	4	5		12
Number of blank tiles (b)	6	10					

b Write down a formula for calculating the number of blank tiles (b) when you know the number of alphabet tiles (a).

8 A child is playing with a set of cubes and spheres and his mother notices that the shapes he is making form a pattern. The first three shapes are shown below.



a Copy and complete the table below.

Number of cubes (c)	1	2	3	4	5	6		20
Number of spheres (s)	4	6						

b Write down a formula for calculating the number of spheres (s) when you know the number of cubes (c).

9 A pipe factory makes circular pipes. The storeman arranges the pipes in stacks which form a pattern. The stacks must not be higher than two layers. The first four stacks are shown below.



a Copy and complete the table below.

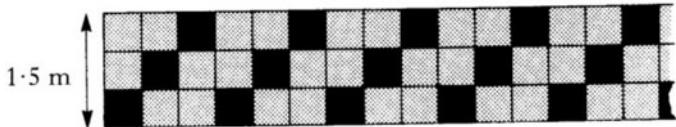
Stack (s)	1	2	3	4	5	6	15
Number of pipes (p)	1	3	5				

b Write down a formula for calculating the number of pipes (p) when you know the stack (s).

10 In a large office block, the corridor floors are covered with carpet tiles. The corridors are 1.5 metres wide.

The carpet tiles are half-metre squares and they come in two colours, grey and black.

The pattern in one of the corridors is shown below.



a How many grey tiles are there in every metre length of corridor?

b If there are G grey tiles in L metres of corridor, write down a formula for G .

c Could this corridor have exactly 39 grey tiles?

Explain clearly your answer.