2 WORKING MATHEMATICALLY 1

Student name: .....

Class: ..... Date: .....

2:01 Solving routine problems

1 The instructions for using lawn fertiliser say:

Coverage: 4 kg per 10 m^2

a Express the instructions as a rate per m^2.

b A lawn has an area of 56 m^2. What weight of fertiliser is recommended?

c What area of lawn could be fertilised by a 20 kg bag?

d How many 20 kg bags would be needed for a rectangular lawn measuring 30 m by 15 m?

4

2 One of the world's busiest airports is O'Hare in Chicago. Under perfect conditions it can handle 105 flight movements (take-offs and landings) every half hour.

a Calculate the number of flight movements per hour.

b During a controller's shift on a fine day there were 945 flight movements. What was the minimum time for the shift?

c Complete this sentence:
'At O'Hare airport there can be one take-off or landing every _____ seconds.'

3

3 Here is a plumber's invoice:

Labour ($3\frac{1}{2}$ hours)	$157.50
Materials (5 tap fittings)	$240.85
Total:	$398.35

a Calculate the rate that the plumber charges per hour for labour.

b Yesterday the plumber did a similar job, which took 2 hours and used three tap fittings. Calculate the total amount charged.

2

4 From a brochure published by a local authority in NSW:

- Water pressure and flow at all new connections should be strong enough to fill a 5-litre bucket in 12 seconds.
- For firefighting, we aim to provide a minimum flow of 15 litres per second to all fire hydrants.

a What is the longest it should take in a new house to fill a 250-litre bath with water? Give your answer in minutes.

b A householder was allowed to use a fire hydrant to fill her swimming pool. It took 37 minutes. Calculate the capacity of the pool.

2

5 *Exactly* 35% of the members of a cultural group are taking part in a performance. What is the minimum number of members taking part?

1

6 The Norris family are thinking of buying a refrigerator priced at $1585. The retailer offers them a discount of $200 if they pay cash. Calculate the percentage discount. Round your answer to 1 dec. pl.

1

7 A dessert recipe uses a mixture of two kinds of chocolate:

- 200 g of white chocolate (cocoa solids make up 21%)
- 150 g of dark chocolate (cocoa solids make up 28%)

Calculate the percentage of cocoa solids in the mixture.

2

8 DLE envelopes measure 22 cm by 11 cm. Which of the following is most likely to be the area of paper needed to make one of these envelopes? Explain.

A 242 cm^2 **B** 282 cm^2
C 484 cm^2 **D** 524 cm^2

_____

_____ 2

9 A chocolate bar is wrapped in a rectangular piece of foil measuring 10 cm by 15 cm.

a Calculate the area of the piece of foil.

b How many pieces of foil could be cut out from a larger sheet of foil measuring 120 cm by 75 cm?

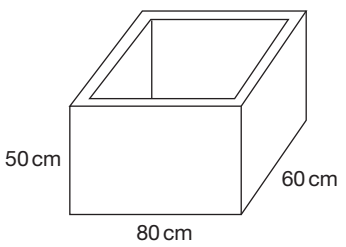
2

10 One of the council town-planning rules for public buildings is that the number of people working in a room is not to exceed one per 20 m^3. A room in a leisure centre measures 12·4 m by 8·3 m and has a height of 3·1 m. Complete this notice, which will be displayed at the entrance:

> Council regulation: Maximum number of people permitted in this room is _____.

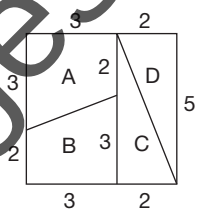
1

11 The diagram shows a wooden planter box with outside measurements of 80 cm, 60 cm and 50 cm. The thickness of the sides is 2 cm. The box is open at the top. Calculate the volume of soil that will fit in the box if the soil is level with the top of the sides.



2

12



This square has an area of 25 m^2. It has been split into two trapeziums (A and B) and two triangles (C and D) as shown.

a What is the area of triangle C?

_____

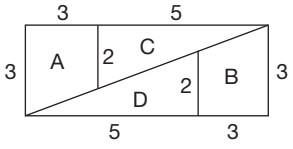
b What is the area of trapezium A?

_____

c What is the total area A + B + C + D?

_____

When the four pieces are rearranged, they look like a rectangle.



d What is the area of a rectangle with sides of 8 m and 3 m?

_____

e Where has 1 m^2 disappeared to? Explain.

_____

_____

5

Result /27

2 WORKING MATHEMATICALLY 2

Student name: .....

Class: ..... Date: .....

2:02 Solving non-routine problems

1 A travel agent sells maps ($10) and atlases ($35) to customers travelling to New Zealand. Here are their sales figures for these items for one week recently. One of the figures is wrong.

Day	Mon	Tues	Wed	Thurs	Fri
Total sales	$35	$60	$25	$55	$70

a Which day must have incorrect sales figures?

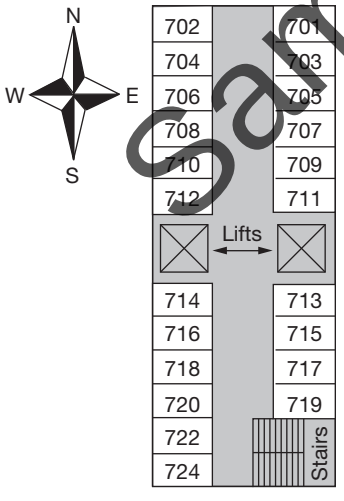
b Which day did they only sell atlases? Explain.

c Which day did they only sell maps? Explain.

d On which day must they have sold both items?

6

2 This diagram is a floor plan for level 7 of a tall hotel. Each floor with guest rooms has the same layout.



a How would you describe the room numbers on the east side of the hotel?

b If you were given room 413 in this hotel, would you expect the view to be facing east or west?

c What is the number of the room one floor above room 706?

d Which room(s) would share a common wall with room 1216?

e A guest wants to go from room 722 to 619. Which way would involve less walking—the lift or the stairs?

f The rooms in this hotel are numbered from 201 to 1324. How many rooms are there?

6

FUN SPOT

Arthur, Belinda, Charlie, Denise and Edward live in a five-level apartment block. Their occupations, in no particular order, are a doctor, a dentist, an architect, a lawyer and a teacher. The doctor lives below Arthur and Denise, but above the lawyer. The architect lives on the third level. Neither the teacher nor Charlie lives on the top level or the bottom level. Belinda, Arthur and Denise live on consecutive levels going downwards.

1 Give the occupations of each person.

2 Who lives on each of the five levels of the building?

2

3 A girls' softball team with nine players and their coach went away to a tournament. While the team was away their principal received a complaint about the pitcher's behaviour. When the girls returned, the principal decided to interview the girls together, and ask each one who the pitcher of the team is.

Anne: 'Emilia is the pitcher.'
Bethany: 'Emilia is not the pitcher.'
Carla: 'I'm the pitcher.'
Donna: 'The pitcher is either Carla or Hinemoa.'
Emilia: 'I'm the pitcher.'
Fa'aa: 'Carla is the pitcher.'
Gayle: 'Carla is not the pitcher.'
Hinemoa: 'I'm not the pitcher and neither is Carla.'
Isabella: 'Hinemoa is right, and Emilia isn't the pitcher either.'

The coach didn't want to name the pitcher in front of the other girls, so said to the principal: 'Three of the girls are telling the truth, and the other six are telling lies.' From this information the principal was able to work out which girl is the pitcher.

Hint: Take each player in turn as being the pitcher, and check the number of truthful statements that result. You can use the table below.

	Truth = ✓ Lying = ✗								
Pitcher	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**
A									
B									
C									
D									
E									
F									
G									
H									
I									
Number telling truth									

Who is the pitcher? Which three girls were telling the truth?

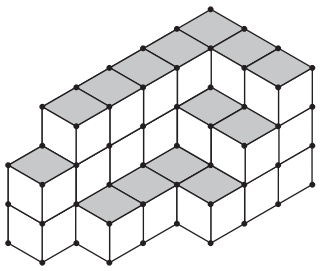
_____

_____

_____

2

4 Work out the least number of small cubes that need to be added to this shape to make a large cube. Assume that there are no missing blocks or extra protruding blocks at the back.



_____

1

5 The Smiths have three children. The product of their ages is 200, and the two youngest are twins. What is the age of their oldest child?

_____

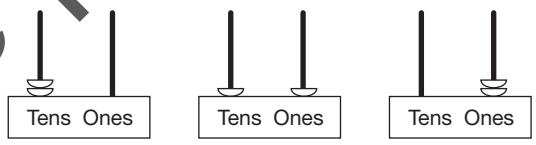
_____

_____

1

INVESTIGATION BEADS ON AN ABACUS

This diagram shows that if you put two beads on a tens/ones abacus you can make the numbers 20, 11 or 2.



1 Write the four numbers you can make if you put three beads on this abacus.

_____ _____

_____ _____

2 How many different numbers can you make with four beads on this abacus?

_____

_____

_____

3 Write all the different numbers you can make with three beads on a hundreds/tens/ones abacus.

_____

_____

3

Result /21

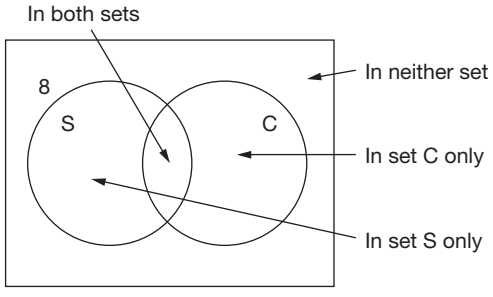
2 WORKING MATHEMATICALLY 3

Student name: .....

Class: ..... Date: .....

2:03 Using Venn diagrams

Venn diagrams are used to show how members fit into different groups. The whole set is shown by a rectangle. Smaller groups, or 'subsets', are represented by circles. Overlapping (or intersecting) circles show that there are members in both groups at the same time.



Example:
There are 140 students in Year 9 at a large school. 80 students play sport for a school team—we label this set S; and 75 play sport for a club team—we label this set C. If 50 students play sport for both a school team and a club, then how many students play for neither?

Answer:
Draw a Venn diagram. Label the two circles S and C to represent the sets.

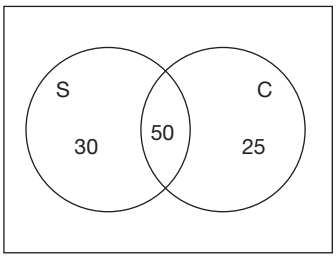
Steps:

1 Write 50 in the intersection.

2 There are 80 students who play for a school team altogether, so that leaves 80 − 50 = 30 for the other part of the circle for set S.

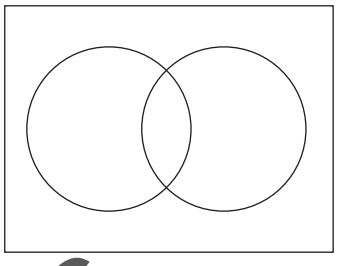
3 There are 75 students who play for a club team altogether, so that leaves 80 − 75 = 25 for the other part of the circle for set C.

4 The number outside both circles is 140 − (30 + 50 + 25) = 140 − 105 = 35



1 Search and Rescue carried out a spot-check of 90 boats in the local marina. 68 were equipped with life jackets and 42 had distress flares. 37 boats had both types of safety equipment.

a Label the sets in the Venn diagram below and transfer the information into the specific sections.



b How many boats had life jackets but no distress flares?

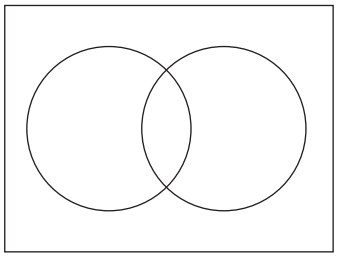
c How many boats had distress flares but no life jackets?

d How many boats had neither of these types of safety equipment?

4

2 Of the 34 students in a Maths class today, 23 have brought a mobile phone to school and 25 have brought a calculator to school. 3 students have neither at school today.

a Label the sets in the Venn diagram below and then use the information to answer questions **b**–**c** that follow.



b How many students have at least one of these items at school today?

c How many students have both a mobile phone and a calculator at school today?

3

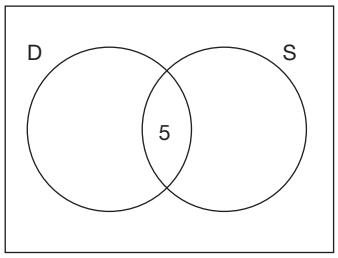
3 A company in downtown Sydney surveys 240 of its employees to ask them how they usually travel to work. 119 take a train, 68 travel by bus, and 39 use both train and bus to travel to work. Draw a Venn diagram in the space below and use it to find how many of the employees use neither mode of transport to travel to work.

2

4 In a class of 31 students, 11 students have blue eyes and 26 are right-handed. There are 3 students who do not have blue eyes and who are not right-handed. How many students are both blue-eyed *and* right-handed?

1

5 A survey of 100 taxidrivers shows that 93 of them use a dashboard-mounted GPS device (D) for navigation, and 5 use a smartphone (S) with a mapping application as well as the dashboard-mounted device. If 3 of the drivers use neither, then how many use a smartphone only for navigation? Use the Venn diagram below to help answer this question.



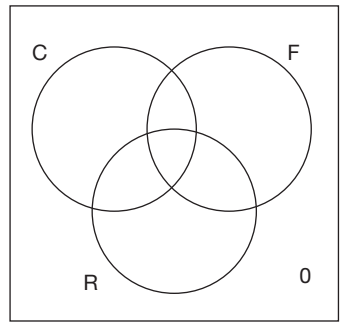
1

6 There are 75 buildings in a country town that are more than one storey high. 64 have public stair access to all levels, and 38 have lift access to all levels. If every building has one or the other kind of access, how many have both types?

1

7 A travel agency sells three different types of transportation tickets—rail, cruise and flight. The travel agency has 80 clients who bought one or more type of ticket. Use the information below to write numbers in specific sections of the Venn diagram.

The Venn diagram shows three intersecting sets, labelled R, C and F.
6 clients booked all three types
3 clients booked cruises and flights but not rail
11 clients booked rail and flights
4 clients booked cruises only
5 clients booked rail only
71 clients booked flights



a Use this information to write numbers in specific sections of the Venn diagram.

b How many clients booked flights only?

c How many clients booked cruises and flights?

d How many clients altogether booked cruises?

e How many clients booked exactly two types of ticket?

f At least one part of the diagram has 0 clients. Describe the clients who would be placed in this category (if there were any!).

6

Result /18