

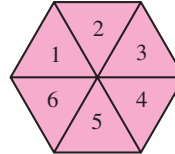
One card is selected at random from a normal pack of 52 playing cards.
Find the probability of selecting:

- (e) the king of diamonds
- (f) an ace
- (g) a red card

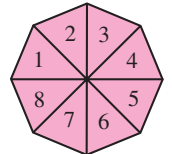
8 Expected probability

- (a) Here are two spinners. Say whether the following statements are true or false. Explain why.

Gill's spinner



Nick's spinner



- (i) 'Gill is more likely than Nick to spin a 4.'
- (ii) 'Gill and Nick are equally likely to spin an even number.'
- (iii) 'If Nick spins his spinner eight times he is bound to get at least one 8'.

- (b) A bag contains 1 blue ball, 3 red balls and 7 white balls.

- (i) If I select a ball at random from the bag without looking, what colour ball am I most likely to select?



What is the probability I select:

- (ii) a white ball?
- (iii) a red ball?
- (iv) a green ball?
- (v) a blue ball?

3.9 Applying mathematics in a range of contexts

In section 3.9 you will:

- solve problems in a variety of real life situations
- solve a range of puzzles
- investigate problems with more than one solution

Exercise 1M

- 1 It cost six people a total of £25.50 for a taxi.

What did it cost each person?

2 Work out

- (a) $480 - 55$ (b) $(4 + 57) \times 0$ (c) $348 \div 6$ (d) $6241 + 582$
 (e) 5×607 (f) $747 - 682$ (g) $4 \times 5 \times 6$ (h) 0.34×1000

3 In a new office building there are 82 doors.

- (a) If each door is fastened by 3 hinges, how many hinges are needed altogether?
 (b) If each hinge requires 6 screws, what is the total number of screws required to fit all the doors?

4 Use the table to write the calculation $2 \times 4 = 8$ using Chinese symbols.

(Use \times for the multiplication unless you know the Chinese symbol.)

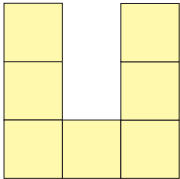
繪 Picture	水 Water	月 Moon	樂 Fun	朝 Morning	考 Think	雪 Snow	鳥 Bird
夢 Dream	人 Person	火 Fire	友 Friend	心 Heart	七 Seven	雨 Rain	宝 Treasure
金 Gold	花 Flower	夜 Night	八 Eight	空 Sky	風 Wind	強 Strength	土 Earth
猫 Cat	星 Star	二 Two	九 Nine	一 One	二 Two	三 Three	四 Four

5 Anil has read 97 of the 448 pages in his book. How many more pages must be read to reach the middle?

6 There are 15 piles of magazines. Eight piles have 20 magazines each, of the other piles each have 25 magazines. How many magazines are there altogether?

7 Write the number 'twelve thousand and eleven' in figures.

8



The area of the 'U' shape is 175 cm^2 .

- (a) Find the area of each small square.
 (b) Work out the length of the perimeter of the shape.

9 There are 208 pupils in year 7 of a school. How many teams of six can be formed? How many pupils will be left over?

10 (a) What is the length of line PQ in millimetres?

(b) What is this length in centimetres?.



Exercise 2M

1 Write the next number in each sequence

- (a) 1 5 9 13
- (b) 32 27 22 17
- (c) 3 6 12 24
- (d) 0.2 2 20

2 In a ‘magic square’ all rows (\longleftrightarrow), columns (\updownarrow), and main diagonals (\diagup and \diagdown) add up to the same ‘magic number’. Copy and complete this magic square.

	10		7
16		2	16
4	17	13	
11			

3 A multi-storey office block has 126 offices altogether. If there are 9 offices on each floor, how many storeys does the building have?

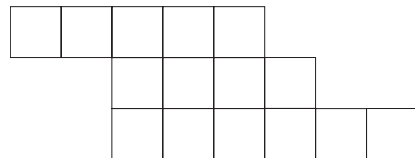
4 Write 30 million pence in pounds and pence.



5 The Coliseum had 2680 windows when it was built. The local window cleaner charged a quarter of a shekel per window and cleaned all the windows once a week.

- (a) What was his total income in 3 weeks?
- (b) Where is the Coliseum?

6 (a) Copy and shade one fifth of this shape.
 (b) What percentage of the shape is left unshaded?



7 Look at this group of numbers...

17, 11, 16, 36, 8

- (a) Which of the numbers is a multiple of both 3 and 4?
- (b) Which of the numbers are prime numbers?
- (c) Which of the numbers are square numbers?

8 Numbers are missing on four of these calculator buttons. Copy the diagram and write in numbers to make the answer 35.



- 9 (a) How many 8 centimetre pieces of string can be cut from a piece of string which is 1 metre in length?
 (b) How much string is left over?
- 10 What number, when divided by 7 and then multiplied by 9, gives an answer of 81?

$$\text{?} \div 7 \times 9 = 81$$

Exercise 3M

- 1 Write down these calculations and find the missing digits.

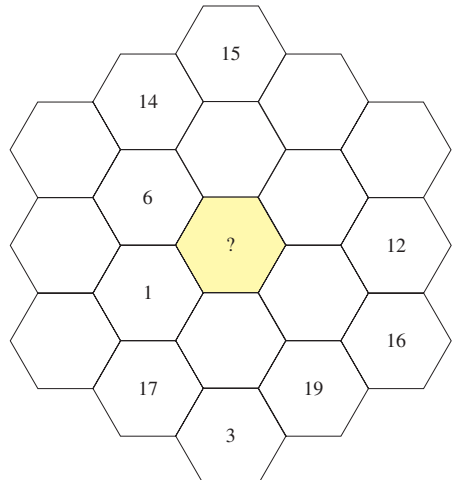
$$\begin{array}{r} 5 \square 5 \\ + 3 2 \square \\ \hline 9 0 1 \end{array}$$

$$\begin{array}{r} 3 \square 9 \\ + 5 8 \square \\ \hline \square 5 3 \end{array}$$

$$\begin{array}{r} \square 1 \square \\ + 5 \square 4 \\ \hline 7 5 0 \end{array}$$

- 2 Find the remainder when 370 is divided by 20.
- 3 The rule for the number sequences below is 'double and add 1'
 Write down each sequence and fill in the missing numbers.
- (a) $2 \rightarrow 5 \rightarrow 11 \rightarrow \square$
 (b) $\square \rightarrow 7 \rightarrow 15 \rightarrow \square$
 (c) $\square \rightarrow 13 \rightarrow \square \rightarrow \square$
- 4 A mixed school has a total of 852 pupils.
 There are 24 more girls than boys.
 How many girls are there?
 [Hint: check your answer.]

- 5 Draw a copy of the grid shown. The sum of the numbers in each column \updownarrow is the same as the sum of the numbers in each diagonal \nearrow or \nwarrow .
 What number goes in the centre?



- 6 How many grams of flour must be added to 2.4 kg to make 4kg altogether?
- 7 How many minutes are there from 06.40 to 08.05?

- 8 A book has 648 pages. Gina has read 42 pages in 3 days. At that rate how long will it take her to read the whole book?
- 9 Ronnie has the same number of 10p and 20p coins. The total value of the coins is £6. How many of each coin does he have?
- 10 Work out the missing numbers



- (a) $204 + 360 = \square$ (b) $270 + \square = 800$ (c) $25 \times \square = 500$
 (d) $\square + 305 = 500$ (e) $\square - 220 = 450$ (f) $\square \div 12 = 8$

Exercise 4M

- 1 The ingredients for a chocolate cake cost £1.25 and the chef charges £1.10 to make each cake. A shop sells the cakes at £11.99. Calculate the total profit made if 200 cakes are sold.
- 2 Find two numbers which multiply together to give 65 and which add up to 18

$$\square \times \square = 65$$

$$\square + \square = 18$$

- 3 A car uses 5 litres of petrol for every 80 km travelled. Petrol costs 98p per litre. Calculate the cost in £s of travelling 400 km.
- 4 Place the numbers in order of size, smallest first.

0.32 0.201 0.2 0.03 0.4

5



An artist won the Turner art prize by 'carefully' walking across his canvas with bare feet. Unfortunately his prize winning piece was thrown in the bin by the cleaner at his studio.

The painting was on sale for £620 000. The cleaner offered to make up for her mistake by paying the artist £20 per week. How many years would it take to pay the full amount?

- 6 The tenth number in the sequence 1, 3, 9, 27, ... is 19683. What is the ninth number?

7 Copy each calculation and find the missing numbers.

$$\begin{array}{r} \text{(a)} \quad \begin{array}{r} 5 \quad 7 \quad \square \\ 3 \quad \square \quad 2 \\ + \quad \square \quad 4 \quad 7 \\ \hline \square \quad 0 \quad 4 \quad 3 \end{array} \end{array}$$

$$\begin{array}{r} \text{(b)} \quad \begin{array}{r} \square \quad 3 \quad 2 \quad 4 \\ 3 \quad \square \quad 0 \quad 2 \\ + \quad 2 \quad 3 \quad \square \quad 5 \\ \hline 8 \quad 1 \quad 4 \quad \square \end{array} \end{array}$$

8 I think of a number, add 3.6 and then multiply by 5.
The answer is 21.6. What is the number I am thinking of?

9 I am a 2 digit prime number.
I am a factor of 184.
What number am I?

Exercise 5M

1 Draw each chain and fill in the missing numbers

$$\text{(a)} \quad \boxed{1.3} \times 4 \rightarrow \boxed{} \times 10 \rightarrow \boxed{}$$

$$\text{(b)} \quad \boxed{0.35} \times 2 \rightarrow \boxed{} \times 100 \rightarrow \boxed{} \div 5 \rightarrow \boxed{}$$

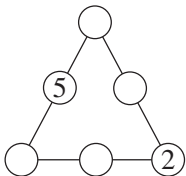
$$\text{(c)} \quad \boxed{2.4} \times 10 \rightarrow \boxed{} \div 1000 \rightarrow \boxed{} \times 2 \rightarrow \boxed{}$$

2 Look at the photo of the pile of matches.

- How many matches are there in each layer?
- Each match is 3 mm thick. How many matches are there in a tower of height 3 cm?
- How high a tower can you build with 14 boxes of matches if each box contains 48 matches?



3



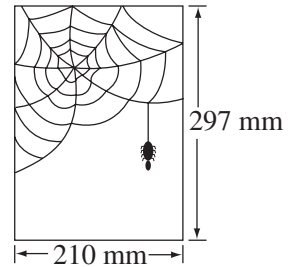
This is a number triangle.
The numbers along each edge add up to 9.
Copy and complete the triangle.
The six numbers are 1, 2, 3, 4, 5, 6.

4 A box has a mass of 230 g when empty.
When it is full of sugar the total mass is 650 g.
What is its mass when it is half full?

5 Write the number ‘five and a quarter million’ in figures.

6 A piece of A4 size paper measures 297 mm by 210 mm.

- (a) A money spider starts at a corner and decides to walk around all sides of the paper. How far will the spider walk in millimetres?
- (b) Change your answer in part (a) into centimetres.
- (c) Has the spider travelled more or less than one metre?



7 In this calculation use each of the digits 1, 2, 3, 4, 5, 6 Put one digit in each box to make the statement true

$$\square \square \times \square = \square \square \square 2$$

8 Copy and complete this multiplication square

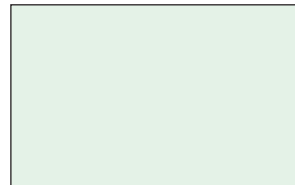
×	3	7		
		35		20
			48	
	27			
			16	8

9 The rule for the number sequences is ‘treble and subtract 1’. Write down each sequence and fill in the missing numbers.

- (a) 1 → 2 → 5 →
- (b) 4 → 11 → →
- (c) 3 → → →

10 Measure the sides of the rectangle and work out

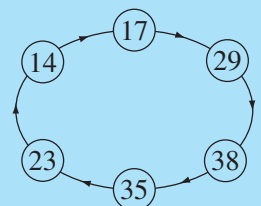
- (a) the area
- (b) the perimeter



Investigation – Number rings

- This is a number ring
Start with any number and multiply the units digit by 4 and then add the tens digit.

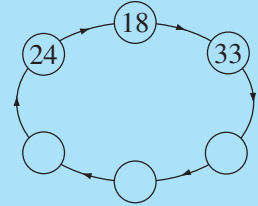
For example 14 → $4 \times 4 + 1$ → 17



The rule is then repeated on 17.

$$\textcircled{17} \longrightarrow 4 \times 7 + 1 \longrightarrow \textcircled{29}$$

- Use the same rule to complete this number ring.
- Does it matter where you start in the ring?
In the ring on the last page could you start at 35? or 23?
- Do you get a closed ring when you start with any 1 or 2 digit number? Hint: Write 1 digit numbers with a zero. (e.g. 02)
- Do any numbers get 'stuck'?



Find out as much as you can and then write a few sentences to show what you discovered.

UNIT 3 MIXED REVIEW

Part one

1 Copy and complete.

(a) $0.71 \times 10 = \square$

(b) $1.52 \times \square = 152$

(c) $86.2 \div \square = 8.62$

(d) $406 \div \square = 0.406$

(e) $0.014 \times \square = 1.4$

(f) $0.1 \times 1000 = \square$

2 The letters from A to Z are shown on the grid.

Decipher the following messages

- (a) (5, 5) (4, 0) (1, 3) (2, 5) \square (4, 2) (-4, 2)
 \square (-5, -3) (-4, 2) (-2, 5) \square (-2, -2)
 (1, 3) (-5, -5) (-5, -5) \square (1, 3) \square (4, -4)
 (1, 3) (0, 1) \square (5, 5) (-2, 1) (2, 5) (4, 0)
 \square (1, 3) \square (5, -2) (-5, 4) (1, 3) (4, 2)
 (-2, 2) \square (-2, 1) (0, 1) \square (4, 0) (-2, 1)
 (5, -2) \square (4, 0) (-2, 2) (1, 3) (4, 2) ? \square
 (4, 2) (-4, 2) (-2, 5) (4, 4) !

- (b) Change the seventh word to: (5, 5) (-2, 1)
 (2, 5) (4, 0) (-4, 2) (-2, 5) (2, 5).
 Change the last word to: (4, 2) (-4, 2)
 (-2, 5) (4, 4) (-5, -5) (1, 3) (5, -2).

- (c) (5, 5) (4, 0) (1, 3) (2, 5) \square (4, 2) (-4, 2)
 \square (-5, -3) (-4, 2) (-2, 5) \square (-2, -2)
 (1, 3) (-5, -5) (-5, -5) \square (1, 3) \square (4, 2)
 (-2, 2) (1, 3) (4, 2) \square (-5, 4) (1, 3) (-3, -4)
 (-3, -4) (-4, 2) (2, 5) ? \square (-5, 4) (-4, 2)
 (-5, -5) (-5, -3) (4, 4) (-4, 2) (0, 1) !

