

5.3 Applying mathematics in a range of contexts 2

In section 5.3 you will:

- solve problems in a wide range of contexts

Exercise 1M

- 1 (a) Copy the pattern below and continue it to the line for 10^2 .

$$2^2 = 1^2 + 1 + 2 = 4$$

$$3^2 = 2^2 + 2 + 3 = 9$$

$$4^2 = 3^2 + 3 + 4 = 16$$

- (b) Without a calculator, use the pattern to work out:

(i) 31^2

(ii) 71^2

(iii) 101^2

(iv) 19^2

- 2 An orange drink costs 60p. A cola costs 70p. Some children buy orange and cola drinks for exactly £10. How many orange drinks are bought and how many colas? Find both possible solutions.

- 3 Asif is working on the top floor of a very tall office building. He walks up 826 steps from the ground floor to his office. Each step is 24 cm.

(a) How high does he climb in cm?

(b) Change the height into km, correct to one decimal place.

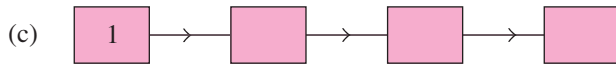
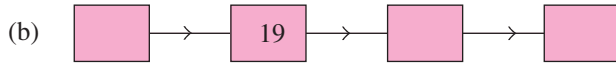
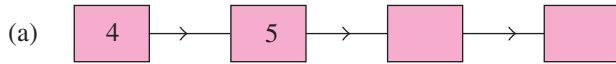


- 4 Three babies, Petra, Quentin and Rusty, are all weighed on April 1st. After that, Petra is weighed every second day, Quentin every third day and Rusty every fifth day. So, for example, Petra is next weighed on April 3, Quentin is next weighed on April 4 and Rusty is next weighed on April 6. What is the next date when all three babies will be weighed on the same day?

- 5 A 375 g packet of Greek currants costs £1.14. Calculate the cost of a 500 g packet, if both packets represent the same value for money.

- 6 A floor measuring 4.2 m by 3.4 m is covered with square tiles of side 20 cm. The tiles cost £3.30 for a pack of 10. How much will it cost to tile the floor?

- 7 The rule for the sequences is 'double and subtract 3'. Write down each sequence and find the missing numbers.



- 8 A tin has a mass of 170 g when empty. When it is full of currants the total mass is 510 g. What is its mass when it is a quarter full?
- 9 Maggie has the same number of 20p and 50p coins. The total value of the coins is £7. How many of each coin does she have?

- 10 Work out
- (a) $\frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \frac{1}{16} + \frac{1}{32}$
- (b) $\frac{1}{2} \times \frac{2}{3} \times \frac{3}{4} \times \dots \times \frac{15}{16} \times \frac{16}{17}$.

Exercise 2M

- 1 Martian creatures are either tripods or octopods. Tripods have three legs. Octopods have eight legs. The Martians, on an exploratory visit to Earth, have 60 legs between them. How many are tripods and how many are octopods? Find both possible solutions.



- 2 Here are two numbers written as the sum of four or fewer square numbers:

$$21 = 16 + 4 + 1$$

$$19 = 16 + 1 + 1 + 1$$

Make the following numbers from four or fewer square numbers.

- (a) 24 (b) 62 (c) 438 (d) 2436
- (e) 6190 (f) 9909

- 3 A car begins a journey at 11.35 and ends it at 13.05.
- (a) How long, in hours, did the journey take?
- (b) The car travelled at an average speed of 100 km/h. How far did the car travel?
- 4 The cooks at McDonalds use 3400 ml of oil in 4 days. How many days will a 200 litre tank of oil last?

5 Write down the most appropriate *metric* unit for measuring:

- (a) the capacity of a car's fuel tank,
- (b) the height of the London Eye,
- (c) the mass of a Jumbo Jet,
- (d) the area of a small farm.

6 At a players' meeting at Arsenal football club all the players can speak French or English or both. If 72% can speak English and 45% can speak French, what percentage of the players can speak both languages?



7 Work out:

- (a) A fifth of 400 000
- (b) 5% of £680
- (c) A half of 999

8 Find the number I am thinking of.

A multiple of 9
 A 3-digit number below 200
 The product of its digits is 16

9 One sector of a pie chart has an angle of 44° . What percentage of the whole chart does this sector represent? Give your answer correct to one decimal place.

10 Find three numbers which add up to 10 and multiply to give 30.

$$\square + \square + \square = 10 \quad \square \times \square \times \square = 30$$

Exercise 3M

1 **Mouse that roared**

Fort summer: A mouse that had been thrown on a pile of burning leaves ran back into the house in New Mexico from which it had been ejected, setting it alight. Luciano Mares, 81, said that the mouse caught fire and ran back beneath a window, from where flames spread throughout the house. (AP)

Read this news item which appeared in a newspaper.

- (a) Remember not to throw mice onto a pile of burning leaves.
- (b) Express Luciano's age as the sum of three square numbers.

