

Rounding numbers

Rules when rounding

Decide which is the last digit being kept; the place you are rounding to. Look at the next digit to the right.

If it is a 5 or above, the last number being kept is increased by 1.

If it is a 4 or below, the number remains unchanged.

For example: When rounding to the nearest hundred thousand, the number in bold is the last number to be kept; the hundred-thousand place.

3 **7**65 125

The number to the right is a 6, so the 7 increases: 3 800 000.

67 **2**14 185

The number to the right is a 1, so the 2 remains unchanged: 67 200 000.



1 Round each of these numbers to the nearest hundred.

a 256 300

b 1685 1700

c 13 912 13 900

d 154 297 154 300

e 9 215 145 9 215 100

f 15 127 956 15 128 000

2 Round each number to the nearest ten-thousand.

a 15 195 20 000

b 185 165 190 000

c 5 849 561 5 850 000

d 95 215 624 95 220 000

e 64 181 468 64 180 000

f 845 641 158 845 640 000

3 Round each number to the nearest million.

a 6 125 189 6 000 000

b 78 168 951 78 000 000

c 951 348 129 951 000 000

d 8 154 562 974 8 155 000 000

e 84 256 138 176 84 256 000 000

f 264 051 782 168 264 052 000 000

4 Each of the following numbers has been rounded to the nearest thousand. Write the range of the original number. The first one has been done for you.

	Lowest value	Highest value
a 4 000	3 500	4 499
b 82 000	<u>81 500</u>	<u>82 499</u>
c 9 848 000	<u>9 847 500</u>	<u>9 848 499</u>
d 152 173 000	<u>152 172 500</u>	<u>152 173 499</u>
e 9 514 197 000	<u>9 514 196 500</u>	<u>9 514 197 499</u>

5 Australia's richest man is reported to have a fortune of \$5 billion. Does this mean he has exactly \$5 billion? Give a reason for your answer.

No, it is likely that the exact size of his fortune has been rounded up or down to \$5 billion.

Rounding decimals

When rounding decimals you follow the same rules as when rounding whole numbers.

For example:

Rounding to the nearest hundredth

5.7478 → 5.75

The number to the right is a 7, so the 4 increases.

OR

Rounding to 2 decimal places

123.3139 → 123.31

The number to the right is a 3, so the 1 remains unchanged.



1 Round each of these numbers to one decimal place:

a 7.39 → 7.4

b 18.93 → 18.9

c 22.563 → 22.6

d 4.825 → 4.8

e 0.7847 → 0.8

f 5.976 → 6.0

2 Round these money values to the nearest 10c:

a \$10.01 → \$10.00

b \$45.76 → \$45.80

c \$6.71 → \$6.70

d \$339.19 → \$339.20

e \$47.58 → \$47.60

f \$83.99 → \$84.00

3 Round each of these numbers to two decimal places:

a 13.872 → 13.87

b 3.347 → 3.35

c 73.182 → 73.18

d 6.049 → 6.05

e 0.2318 → 0.23

f 0.999 → 1.00

4 Each of the following numbers has been rounded. Write the range of the original number. The first has been done for you.

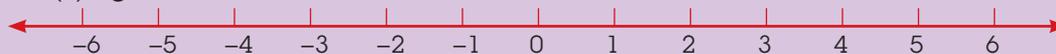
	Lowest value	Highest value
a 3.7	3.65	3.74
b 12.3	<u>12.25</u>	<u>12.34</u>
c 8.5	<u>8.45</u>	<u>8.54</u>
d 0.94	<u>0.935</u>	<u>0.944</u>
e 60.05	<u>60.045</u>	<u>60.054</u>
f 39.742	<u>39.7415</u>	<u>39.7424</u>

5 Wood can be bought from Tim's Hardware Store in lengths measured to the nearest centimetre. Hugo has measured and calculated that he needs 5.893 m of wood. What length should Tim cut?

Tim should cut 590cm.

Negative numbers

Positive numbers are larger than zero and count to the right along a number line. For every positive number there is a negative number that is its opposite. These negative numbers count to the left along the number line and are identified by the minus (-) sign in front of them.



The further to the left you go, the smaller the number; so -6 is smaller than -2 .

1 Complete the number lines by filling in the missing numbers.



2 Write $<$ or $>$ to make each statement correct.

- a** $9 > 5$ **b** $-8 < 5$ **c** $-6 > -9$
d $-3 > -12$ **e** $-19 > -27$ **f** $-20 < -3$
g $-100 < -10$ **h** $-92 > -200$ **i** $-300 < -60$

3 Use the information in the table to answer the following:

Place	Min	Max
Hot, Iceland	-13	-2
Stockholm, Sweden	-16	-2
Omsk, Russia	-20	-13
Mawson, Antarctica	-21	-15
North Pole, Arctic	-33	-29
Punta Arenas, Chile	-11	-1

a Which location had the lowest minimum temperature?

North Pole, Arctic (-33°)

b Which location had the lowest maximum temperature?

North Pole, Arctic (-29°)

c Which place had the warmest day? What temperature was it?

Punta Arenas, Chile (-1°)

d Which place had the smallest difference between its maximum and minimum temperatures?

North Pole, Arctic: difference of 4°

Focus on addition

1 Add the following numbers. In the space provided, show how you solved the addition.

a $2817 + 4404 =$ 7221

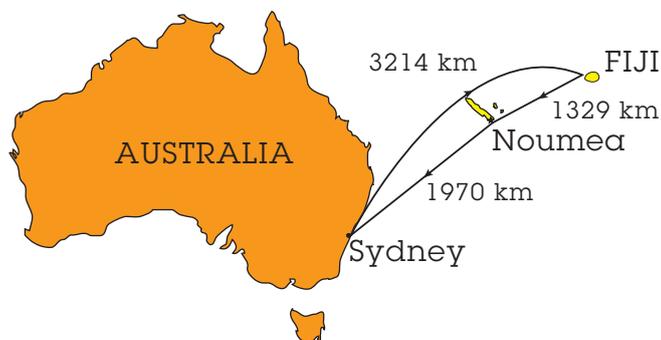
b $9859 + 6394 =$ 16253

c $13805 + 28020 =$ 41825

d $72292 + 19577 =$ 91869

2 Compare your answers with a classmate. Did you use the same method to solve each question?

3 Samantha takes a cruise that starts in Sydney and travels the Pacific Islands as shown in the picture. How far does the ship travel altogether?



6513 kilometres

4 Two adults and two children wish to take a holiday to Disneyland. They can get a package trip for \$2496 per adult and \$1733 per child. How much will it cost them for this holiday?

\$8458



Where would you like to visit? Research how much it would cost for you and your family to travel there.

MiB 3
Card 24

Addition of larger numbers

1 Find the sum using a mental strategy.

a $7 + 2 + 6 + 9 + 1 = \underline{25}$

b $12 + 7 + 6 + 4 + 10 = \underline{39}$

c $25 + 21 + 48 = \underline{94}$

d $69 + 16 + 79 = \underline{164}$

e $613 + 655 = \underline{1268}$

f $911 + 457 = \underline{1368}$

g $5731 + 5587 = \underline{11318}$

h $9251 + 1473 = \underline{10724}$

2 Describe the mental strategy you used to calculate Question 1b in the space below. Compare your answer with a classmate's.

I added six to four to make ten, then added the remainder of the numbers.

3 A car transport truck can carry a maximum mass of 15 000 kg.

If the following cars are loaded onto the truck, will it be overloaded? No.

If so, by how many kilograms will it be overloaded? Total weight 12702kg

Car	No.	Mass (per car)
Ford Explorer	2	1955 kg
Hummer H3	1	2303 kg
Range Rover Sport	2	2530 kg
Kingswood stationwagon	1	1429 kg



4 The salaries Brad Pitt and Nicole Kidman earned in 5 of their movies are shown in the table. How much has each earned altogether? Who earned more? How much more?

Brad Pitt		Nicole Kidman	
Movie	Salary	Movie	Salary
<i>Mr and Mrs Smith</i>	\$20 000 000	<i>The Golden Compass</i>	\$15 000 000
<i>Troy</i>	\$17 500 000	<i>Margot at the Wedding</i>	\$ 6 000 000
<i>Oceans 11</i>	\$30 000 000	<i>Bewitched</i>	\$17 500 000
<i>Spy Game</i>	\$17 500 000	<i>The Interpreter</i>	\$17 500 000
<i>The Mexican</i>	\$10 000 000	<i>Birth</i>	\$15 000 000

Brad Pitt has earned \$24 000 000 more.

6 Number and Place Value

Estimating and calculating

1 Use mental strategies to round these numbers and then estimate each sum.



Use a calculator to check your estimates.

	Estimate	Calculator answer
a	$5583 + 4498 =$	10100
b	$51\,759 + 49\,677 =$	101500
c	$686\,452 + 476\,839 =$	1164000
d	$5\,669\,907 + 8\,655\,107 =$	14325000
e	$94\,574\,188 + 86\,631\,069 =$	181000000



2 Catalina has had a part-time casual job at the local supermarket for four years. The amount of money she has earned and the amount of tax she has paid are shown in this table.

Year	Earned	Tax
1	\$5728	\$0
2	\$13173	\$1076
3	\$18702	\$1905
4	\$19970	\$2096

a How much has Catalina earned in four years?

\$57573

b How much tax has she paid to the government?

\$5077

c Suggest a reason why the amount she earned in her first year was so much less than the other years.

She may have worked fewer hours.

3 Use a calculator to help you find the missing numbers in each addition.



$$\begin{array}{r} 9 \boxed{5} 4 \ 6 \ 1 \ 5 \\ + \ \boxed{1} 5 \ 5 \ 7 \ 2 \ 9 \\ \hline = \ \boxed{1} \ 1 \ 1 \ 0 \ 3 \ \boxed{4} \ 4 \end{array}$$

$$\begin{array}{r} \boxed{3} 9 \ 4 \ \boxed{2} 5 \ 1 \\ + \ 5 \ 8 \ \boxed{1} 8 \ 3 \ 2 \\ \hline = \ 9 \ 7 \ 6 \ 0 \ 8 \ \boxed{3} \end{array}$$

$$\begin{array}{r} 6 \ \boxed{9} 0 \ 9 \ 4 \ 7 \\ + \ \boxed{1} 3 \ 0 \ 3 \ 2 \ \boxed{7} \\ \hline = \ 8 \ 2 \ 1 \ \boxed{2} 7 \ 4 \end{array}$$

MIB 3
Card 32

Methods of subtraction

1 Complete each subtraction using an appropriate strategy.

a $992 - 885 = \underline{\quad 107 \quad}$ **b** $398 - 213 = \underline{\quad 185 \quad}$
c $5426 - 4802 = \underline{\quad 624 \quad}$ **d** $9659 - 8994 = \underline{\quad 665 \quad}$
e $7164 - 5004 = \underline{\quad 2160 \quad}$ **f** $9734 - 7292 = \underline{\quad 2442 \quad}$

2 Explain below how you calculated the answer to Question 1d.

*I subtracted 9000 from 9659, and then added six
to that result (the difference between 9000 and 8994).*

3 Compare your answer to Question 2 with your classmates. Write in the space below a different mental strategy that can be used to work out the answer to Question 1d.

*Use the jump strategy. Take away six hundreds,
then six tens, then five units.*

4 Complete the following subtractions and check your answer by completing the inverse operation.

Remember!
The inverse (reverse) operation to subtraction is addition.

a $\begin{array}{r} 960422 \\ - 480804 \\ \hline 479618 \end{array}$ **b** $\begin{array}{r} 506472 \\ - 458055 \\ \hline 48417 \end{array}$ **c** $\begin{array}{r} 940608 \\ - 868280 \\ \hline 72328 \end{array}$ **d** $\begin{array}{r} 726723 \\ - 110627 \\ \hline 616096 \end{array}$

5 **a** Susan and Sacha purchase their first home for \$215 000. A few years later they sell it for \$380 000. How much profit do they make?

\$165 000

b They purchase a new home for \$468 000. How much money do they need to borrow, if they use the profit from the sale of their first house to help buy their new home?

\$303 000



What is stamp duty? When does stamp duty have to be paid? To whom is it paid? How is stamp duty calculated? How would this change the answer to Question 5?

MiB 3
Card 22

8 Number and Place Value

Subtraction using larger numbers

1 Find the difference.

a	$884 - 656 =$	$\underline{\quad 228 \quad}$	b	$786 - 424 =$	$\underline{\quad 362 \quad}$
c	$8538 - 3017 =$	$\underline{\quad 5521 \quad}$	d	$7371 - 6806 =$	$\underline{\quad 565 \quad}$
e	$7343 - 3633 =$	$\underline{\quad 3710 \quad}$	f	$2789 - 1761 =$	$\underline{\quad 1028 \quad}$
g	$90\,652 - 84\,125 =$	$\underline{\quad 6527 \quad}$	h	$59\,834 - 34\,499 =$	$\underline{\quad 25\,335 \quad}$

2 Calculate the answer to each subtraction.

a	$\begin{array}{r} 6\,767 \\ - 1\,982 \\ \hline 4\,785 \end{array}$	b	$\begin{array}{r} 9\,316 \\ - 2\,334 \\ \hline 6\,982 \end{array}$	c	$\begin{array}{r} 90\,432 \\ - 89\,015 \\ \hline 1\,417 \end{array}$	d	$\begin{array}{r} 77\,641 \\ - 70\,798 \\ \hline 6\,843 \end{array}$
e	$\begin{array}{r} 77\,447 \\ - 51\,152 \\ \hline 26\,295 \end{array}$	f	$\begin{array}{r} 574\,822 \\ - 213\,827 \\ \hline 360\,995 \end{array}$	g	$\begin{array}{r} 288\,146 \\ - 119\,892 \\ \hline 168\,254 \end{array}$	h	$\begin{array}{r} 388\,546 \\ - 206\,936 \\ \hline 181\,610 \end{array}$

3 Write two subtraction statements that all have the answer 38 912. You may use a calculator.



$90451 - 51539 = 38912$	$62535 - 23623 = 38912$
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4 The distance between the orbit of Earth and the orbit of Mars is 78 340 000 km. The distance between the Earth's orbit and Jupiter's orbit is 628 730 000 km. How far is it between the orbit of Mars and the orbit of Jupiter?



$\underline{\quad 550\,390\,000\text{ km} \quad}$



5 It takes Earth 365 days to orbit the Sun and takes Neptune 60 190 days. What is the difference in days between the lengths of their orbits?

$\underline{\quad 59\,825 \text{ days} \quad}$

6 The diameter of Earth is 12 756 km and the diameter of Venus is 12 104 km. How much larger is the Earth's diameter?

$\underline{\quad 652\text{ km} \quad}$



4

Estimating your answer

- 1 a** Use mental strategies to estimate each difference. Record your estimates in the table.



Use a calculator to complete the subtractions. Record the calculator answer in the table.

		Estimate	Calculator answer
i	$9\ 674 - 1\ 606 =$	8 100	8 068
ii	$91\ 493 - 11\ 310 =$	80 180	80 183
iii	$773\ 704 - 169\ 454 =$	600 000	604 250
iv	$9\ 241\ 462 - 1\ 546\ 702 =$	8 700 000	7 694 760

- b** Compare the estimate you wrote to the answer from the calculator. Are your calculator answers reasonable, given your estimates?

Yes. They are quite close.

- 2** Answer these questions in the space provided.

- a** A steam locomotive provides 1 790 400 watts of power. An electric locomotive provides 5 222 000 watts. How much more power does an electric locomotive provide?

3 431 600 watts



- b** Warragamba Dam holds 2 027 000 ML when full. It currently holds 1 228 390 ML of water. How many megalitres are required to fill it to capacity?

798 610 ML



- c** Mt Everest, the highest point on Earth, is 8850 m above sea level. Mt Kosciuszko, the highest point in Australia, is 2228 m above sea level. How much higher is Mt Everest?

6 622m



Focus on subtraction

- 1 Identify with a tick (✓) which of the questions written below require subtraction to solve them.

		Subtraction needed? (✓)
a	Max earned \$48K and paid \$9K to the government as tax. How much money did Max receive?	✓
b	Juliet bought a piece of land for \$48 000 and sold it 2 years later for \$15 000 more. What was the selling price?	
c	Akanni sold his car for \$15 000 and his motorcycle for \$9000. How much money did he make?	
d	Brianna has \$15 000 in her bank account, but she used to have \$48 000. How much did she withdraw?	✓



How did you distinguish between those questions that required addition and those that required subtraction? What were the key words or phrases that helped you?

2



In Australia, a census is held every five years. Data from the 2006 and 2001 census is shown in the table below. Use this information to answer these questions.

	2006 census	2001 census
Population of Australia	19 855 288	18 769 249
Population of Victoria	4 932 422	4 612 097
Population of Melbourne, Victoria	3 592 591	3 338 704

- a What was the difference between Australia's population in 2001 and 2006?

1 086 039

- b What was the population of Victoria excluding Melbourne in 2001?

1 273 393

- c What was the population of Victoria excluding Melbourne in 2006?

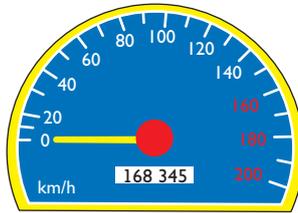
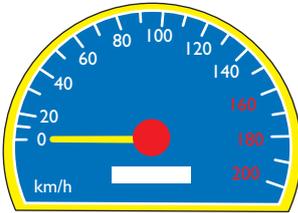
1 339 831

- d Did the population of Victoria, excluding Melbourne, increase or decrease from 2001 to 2006? By how much?

Increase, by 66 438 people.

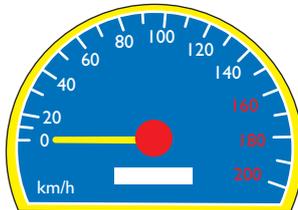
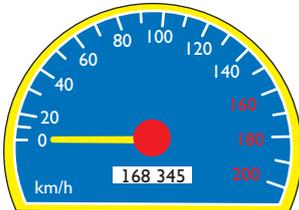
On the road

- 1 Michael drives his semitrailer from Sydney to Canberra, then to Melbourne, a total of 942 km. If his odometer reads 168 345 at the end of the trip, what did it read when he started?



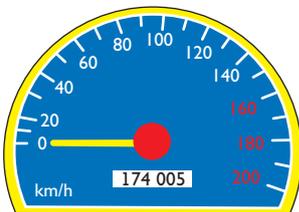
167 403 km

- 2 If Michael then travels from Melbourne to Adelaide and back to Sydney, a total of 2134 km, what does his odometer read on arrival in Sydney?



170 479 km

- 3 During the next week, Michael drives distances to and from Sydney. His odometer reading at the end of the week is shown below. How many kilometres did he travel in the week?



3526 km

- 4 The semitrailer uses 1L of diesel to travel approximately 4 km. How many litres of diesel did Michael's truck use on his round trip from Sydney to Melbourne and Adelaide?

$$\text{Total trip distance} = 942 + 2134 = 3076 \text{ km}$$

$$\text{Total fuel use} = 3076 \div 4 = 769 \text{ L}$$

- 5 Research the current price of diesel fuel. Use it to calculate the fuel cost of Michael's round trip from Sydney to Melbourne and Adelaide.

Diesel prices are currently on average 144.2¢ per litre.

$$769 \times 1.442 = \$1108.90 \text{ is the total cost of his trip.}$$

Division by single digits

1 Complete the following divisions using an appropriate strategy.

a	$314 \div 6 =$	$\frac{52r2 \text{ or } 52 \frac{1}{3}}{\quad}$	b	$170 \div 4 =$	$\frac{42r2 \text{ or } 42 \frac{1}{2}}{\quad}$
c	$\frac{675}{5} =$	$\frac{135}{\quad}$	d	$\frac{286}{8} =$	$\frac{35r6 \text{ or } 35 \frac{3}{4}}{\quad}$
e	$7 \overline{) 224} =$	$\frac{32}{\quad}$	f	$9 \overline{) 531} =$	$\frac{59}{\quad}$
g	$700 \div 3 =$	$233 \frac{1}{3} \text{ or } 233r1$	h	$\frac{927}{8} =$	$\frac{115 \frac{7}{8} \text{ or } 115r7}{\quad}$



5

2 Circle the numbers that are divisible by 3.

- | | | | |
|-------|--------|--------|------|
| | 68 | (111) | (96) |
| (909) | 931 | (8385) | |
| 217 | (900) | (57) | |
| | (186) | (255) | |
| 1108 | 29 488 | 28 | 1234 |

3



Mario purchased the following goods using store finance with a six-month interest-free period. If Mario wants to complete payment in six months so he doesn't have to pay interest, how much will he need to pay each month?



a \$9000
\$1500



b \$2994
\$499



c \$5496
\$916



d \$996
\$166



e \$29 999
\$4999.84



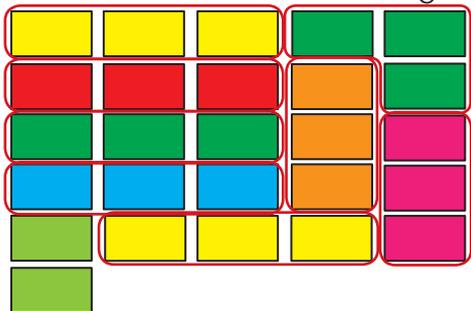
f \$1893
\$315.50

Remainders as fractions

When a group of objects is divided, there is sometimes a remainder. This remainder can be considered as 'part of a group'. There are not enough objects remaining to create a whole group. As it is **part of a group**, it can be written as a **fraction**.

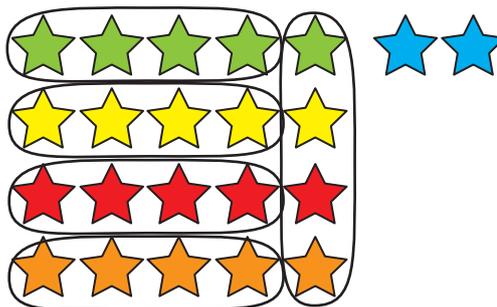
1 Use the diagrams provided to complete the divisions by circling the dividing groups. Write your answer as a fraction. The first one has been done for you.

a 26 blocks are stacked 3 high.



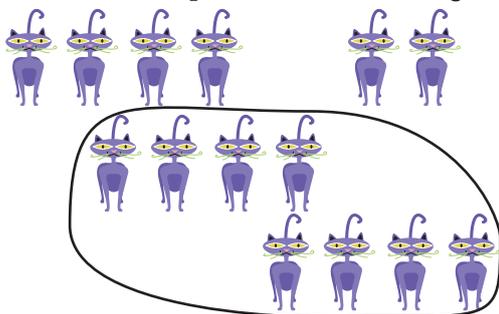
$$26 \div 3 = 8\frac{2}{3}$$

b 22 stars are stuck into 4 books.



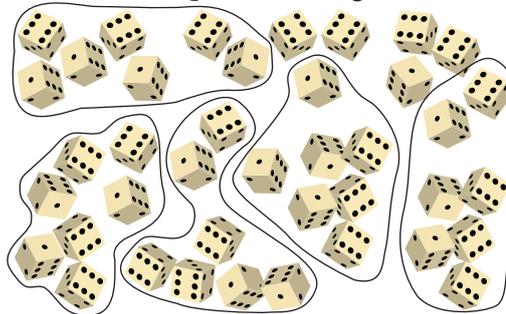
$$22 \div 4 = 5\frac{1}{2}$$

c 14 cats are placed into 8 cages.



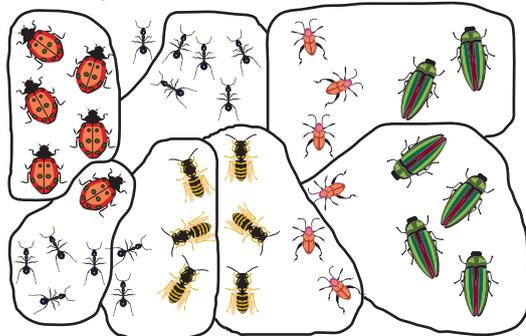
$$14 \div 8 = 1\frac{3}{4}$$

d 40 dice are put into 7 game boxes.



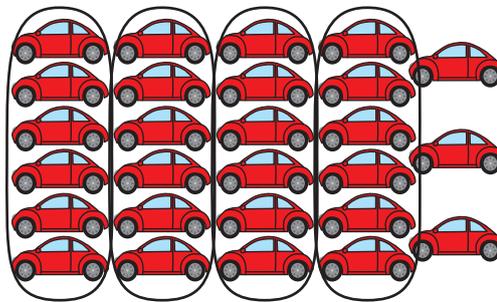
$$40 \div 7 = 5\frac{5}{7}$$

e 36 bugs are put into 5 jars.



$$36 \div 5 = 7\frac{1}{5}$$

f 27 cars loaded onto 6 trucks.



$$27 \div 6 = 4\frac{1}{2}$$

Remainders as decimals

- 1 a** Complete the following divisions and write your answers as a mixed number. If necessary, draw a diagram to help you.

- b**  In the box, write the fraction as a decimal number. If necessary, round to 3 decimal places. Use a calculator to help if needed.

Remainders can also be written as decimals. A calculator will give you a remainder as a decimal. You can change your fraction answer into a decimal using what you know about equivalent fractions.

For example:

$4\frac{1}{2}$ can be written as 4.5

$6\frac{1}{10}$ can be written as 6.1

i $41 \div 2$

ii $\frac{83}{4}$

iii $5 \overline{)67}$

$20\frac{1}{2} =$

$20\frac{3}{4} =$

$13\frac{2}{5} =$

iv $76 \div 10$

v $\frac{82}{5}$

vi $4 \overline{)33}$

$7\frac{3}{5} =$

$16\frac{2}{5} =$

$8\frac{1}{4} =$

- 2** A group of 179 students go on a school camp. They sleep in rooms that each contain 3 double bunk beds. How many rooms are needed?



Each room has six beds so $\frac{179}{3} = 29\frac{5}{6}$. 30 rooms are needed.

Fundraising fun

1 To raise money for their graduation party, some Year 6 students decide to make and sell hampers for Mother's Day. A list of the contents of each hamper is shown on the right.

- 8 teabags
- 4 coffee bags
- 6 chocolates
- 3 biscuits
- 2 ceramic cups



6

a If the students have the following numbers of items, how many hampers can be made? Write any leftover items as a fraction.

609 teabags $76\frac{1}{8}$

388 coffee bags 97

811 chocolates $135\frac{1}{6}$

779 biscuits $259\frac{2}{3}$

277 ceramic cups $138\frac{1}{2}$

b What is the maximum number of complete hampers that the students can make with this number of items?

76 hampers

c If you bought some extra items, which ones would you buy to make the maximum number of hampers? Give reasons for your choice.

I would buy more tea bags and coffee bags to

maximise the number of hampers.

2 A different group of Year 6 students decides to sell stickers to students at the school. Students buy 3 stickers for \$1. One roll of stickers has 200 stickers. How many students can buy stickers from one roll if they all buy 3 stickers?



66 students can buy stickers.

1-digit multiplication

1 Complete this table.

x	2	5	7	10	11	12	20
3	6	15	21	30	33	36	60
4	8	20	28	40	44	48	80
6	12	30	42	60	66	72	120
8	16	40	56	80	88	96	160
9	18	45	63	90	99	108	180

2 An organic farmer sells his produce in 8 different locations in his local area. Every day he delivers the same amount of produce to each location, listed on the right. How much of each item is delivered daily?

Bananas: 18 hands
Potatoes: 45 kg
Carrots: 27 kg
Apples: 68 pieces
Eggs: 17 dozen

$$\text{Bananas} = 144 \text{ hands} \quad \text{Potatoes} = 360 \text{ kg}$$

$$\text{Carrots} = 216 \text{ kg} \quad \text{Apples} = 544 \text{ pieces} \quad \text{Eggs} = 136 \text{ dozen}$$

Can the farmer produce these goods all year around? Which of them are seasonal? If he could deliver this quantity every day of the year, how much would he deliver in a week? How much in a year?

3 A cement truck has to deliver 6 loads of concrete to a building site. All the loads of concrete have the same mass of 2156 kg each. What is the total mass of concrete the truck will carry?



$$12936 \text{ kg}$$

More 1-digit multiplication

- 1** Colour the squares where the multiplication has an answer greater than 3500.

189×6	995×7	646×7	725×2
519×4	838×2	926×9	368×6
377×9	129×5	556×7	103×9
408×7	838×3	502×4	147×3

- 2** What method did you use for Question 1? (How did you do it? What did you consider/look at? How did you do the calculations?) Write your response in the space below.

3500 is 7×500 , so I looked at those multiplications

with 7 or higher or 500 or higher, rounding units

down to the nearest 100 for ease of calculation.

Share your answer to Question 2 with several classmates. Did you all use the same method? Did you use only one way to complete Question 1 or did you use several?

- 3** **a** Write an estimate for each of the following multiplications.

- b**  Use a calculator to find the answers. How does the answer compare to your estimate?

i $86\,522 \times 6$ Estimate: 521 000 Calculator answer: 519 132

ii $16\,947 \times 7$ Estimate: 119 000 Calculator answer: 118 629

iii $70\,316 \times 8$ Estimate: 560 000 Calculator answer: 562 528

- 4** Caden is a travel agent. He is asked to organise a safari trip to Kenya. The all-inclusive holiday package Caden finds costs \$10 229 per person and includes return business-class airfares, meals and an 11-day safari.



- a** What is the total cost for a family of 4?

\$40916

- b** Flying economy class instead of business class costs \$3251 less per person. How much would the family save by travelling economy instead of business class?

$(4 \times 3251) = \$13\,004$

Space travel calculations

1



The International Space Station travels 27 740 km in one hour.



- a How far does it travel in 4 hours?

$$110\,960\text{km}$$

- b Use your answer to Question 1a to help you calculate how far the International Space Station travels in 12 hours.

$$110\,960 \times 3 = 332\,880\text{km}$$

- c Use your answer to Question 1b to help you calculate how far the International Space Station travels in a day.

$$332\,880 \times 2 = 665\,760\text{km}$$

- d The distance that the International Space Station travels to complete an orbit of Earth is 41 610 km. How many times does the space station orbit Earth in 24 hours?

$$665\,760 \div 41\,610 = 16 \text{ times}$$

2



The *Voyager 2* space probe launched in August 1977 travelled through our Solar System at an amazing 1 350 700 km each day or 493 million kilometres a year.

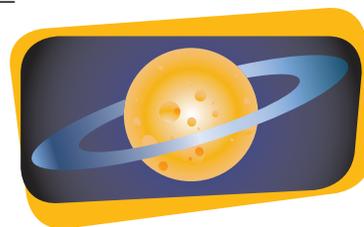


- a *Voyager 2* took approximately 720 days to reach Jupiter. Approximately how many kilometres did it travel to Jupiter?

$$720 \times 1\,350\,700 = 972\,504\,000\text{km}$$

- b *Voyager 2* passed Saturn in 1981, Uranus in 1986 and finally Neptune in August 1989; 12 years after it left Earth. By the time it got to Neptune, how many kilometres had it travelled?

$$12 \times 493 \text{ million} = 5\,916\,000\,000\text{km}$$

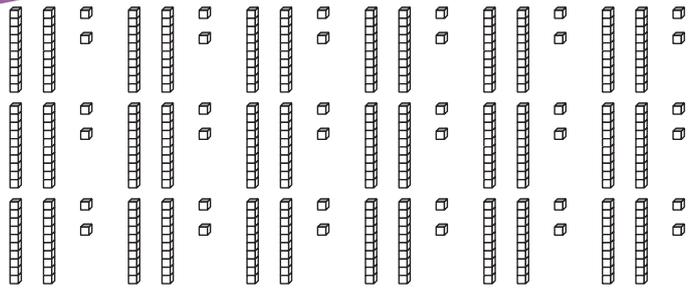


- c It is thought *Voyager 2* continues its journey beyond our Solar System, although we have lost contact with it. If so, how far has it travelled?

$$493 \text{ million} \times (2011 - 1977) = 16\,762\,000\,000\text{km}$$

Multiplying with larger groups

- 1** Use the diagram of Base 10 materials to answer the questions.



- a** Write the multiplication statement that these Base 10 materials represent.

$$36 \times 10 + 36 \times 1 = 396$$

- b** To find the answer to this multiplication, explain how you would rearrange the Base 10 materials.

Rearrange the units into groups of ten so there would

$$39 \text{ tens and } 6 \text{ units} = 390 + 6 = 396$$

- c** Can the Base 10 blocks shown be regrouped according to the following statement? 18 groups of 20 and 18 groups of 2 Yes

- d** Use mental strategies to calculate how many blocks are in:

i 18 groups of 2 36 **ii** 18 groups of 20 360

- e** How many Base 10 blocks are shown? Write your answer as a multiplication number sentence.

$$36 \text{ groups of ten plus } 36 \text{ units equal } 396 \text{ Base } 10 \text{ blocks}$$

- 2** Rewrite the groupings for these multiplications and use them to find the answers. The first one has been done for you.

a 37×76

37 groups of 6 2 2 2

37 groups of 70 2 5 9 0

2 8 1 2

$$37 \times 76 = 2812$$

b 32×47

32 groups of 7 2 2 4

32 groups of 40 1 2 8 0

1 5 0 4

$$32 \times 47 = 1504$$

c 14×56

14 groups of 6 8 4

14 groups of 50 7 0 0

7 8 4

$$14 \times 56 = 784$$

d 27×92

27 groups of 2 5 4

27 groups of 90 2 4 3 0

2 4 8 4

$$27 \times 92 = 2484$$

Long multiplication

How would you do this problem?

A greengrocer buys 81 trays of peaches at the market. Each tray has 56 peaches. How many peaches does the greengrocer have altogether? 56×81 can be calculated by multiplying 56 by 1 and 56 by 80 and adding the answers. This process is known as 'long multiplication'.

Long multiplication

Step 1: Start by estimating the answer: 56×81 is close to $60 \times 80 = 4800$.

Step 2: Write the numbers one under the other.

Step 3: Multiply 56 by 1, and write the answer below the line.

Step 4: Under the answer to Step 3, write 0 in the units column. Then multiply 56 by 8 and write the answer next to the 0. The 0 is written in the units column because the 8 is really 80. It's easier to multiply by 10 first by adding the 0 and then to multiply by 8.

Step 5: Add the two rows (the answers from Steps 3 and 4).

Step 6: Check that your answer is close to the estimate from Step 1. 4536 is close to 4800 so the answer is reasonable.

$$\begin{array}{r}
 \text{Step 2} \quad \quad \quad 4 \\
 \quad \quad \quad 56 \\
 \times \quad 81 \\
 \hline
 \text{Step 3} \quad \quad \quad 56 \\
 \text{Step 4} \quad + \quad 4480 \\
 \hline
 \text{Step 5} \quad \quad \quad 4536
 \end{array}$$

1



Complete the following long multiplications and use a calculator to check you have completed them correctly.

a

$$\begin{array}{r}
 28 \\
 \times 71 \\
 \hline
 28 \\
 1960 \\
 \hline
 1988
 \end{array}$$

b

$$\begin{array}{r}
 96 \\
 \times 23 \\
 \hline
 288 \\
 1920 \\
 \hline
 2208
 \end{array}$$

c

$$\begin{array}{r}
 98 \\
 \times 74 \\
 \hline
 392 \\
 6860 \\
 \hline
 7252
 \end{array}$$

d

$$\begin{array}{r}
 85 \\
 \times 96 \\
 \hline
 510 \\
 7650 \\
 \hline
 8160
 \end{array}$$

e

$$\begin{array}{r}
 73 \\
 \times 88 \\
 \hline
 584 \\
 5840 \\
 \hline
 6424
 \end{array}$$

f

$$\begin{array}{r}
 59 \\
 \times 47 \\
 \hline
 413 \\
 2360 \\
 \hline
 2773
 \end{array}$$

How would you complete 86×90 ? Can this be done in one line? Which step in the box can be left out? Why?

2-digit by 3-digit multiplication

1 Complete the following long multiplications.



8

$$\begin{array}{r} \alpha \quad 71 \\ \times 74 \\ \hline 284 \\ 4970 \\ \hline 5254 \end{array}$$

$$\begin{array}{r} \mathbf{b} \quad 23 \\ \times 94 \\ \hline 92 \\ 2070 \\ \hline 2162 \end{array}$$

$$\begin{array}{r} \mathbf{c} \quad 99 \\ \times 13 \\ \hline 297 \\ 990 \\ \hline 1287 \end{array}$$

2 a Complete each statement.

b Estimate the answer of the multiplication.

c Solve the question using the long multiplication method.

d  Use a calculator to check you are correct.

i $133 \quad 133$ groups of 9
 $\times 89 \quad \underline{133}$ groups of 80

Estimate: 11837

iii $323 \quad \underline{323}$ groups of 7
 $\times 67 \quad \underline{323}$ groups of 60

Estimate: 21641

ii $804 \quad \underline{804}$ groups of 9
 $\times 99 \quad 804$ groups of 90

Estimate: 79596

ii $379 \quad \underline{379}$ groups of 6
 $\times 46 \quad \underline{379}$ groups of 40

Estimate: 17434

The multiplication 426×39 is completed by adding 426 groups of 9 to 426 groups of 30.

3 Ravi has a weekend job selling televisions. For every television Ravi sells, he receives \$63 commission. One weekend he sold 16 televisions. How much commission was Ravi paid for selling these TV units?



\$1008

Large multiplications

1 Although there are differences between individuals, it is generally considered by companies and manufacturers that on average a 10-year-old child has a mass of 32 kg. Use the space provided to complete your working.

a An elevator fits 18 students from a Year 4/5 class. What is their total mass?

576kg

b What is the total mass of a class of 28 students who are 10 years old?

896kg

c A school bus holds 59 students. What is the mass of students on board?

1888kg

2 A dairy cow produces about 26 litres of milk a day for 299 days in a year.

a How much milk will the cow produce in a year? Use the space provided to complete your working.

7774L

b If this cow produces milk for 8 years, how much milk has it produced?

62192L



$$26 \times 299 = \begin{array}{r} 299 \\ \times 26 \\ \hline 1794 \\ 5980 \\ \hline 7774 \end{array}$$

3 Marcus belongs to a motorcycle club that goes riding every Sunday afternoon. Each time they go out, the group travels about 415 km.

a How many kilometres does the group travel in 4 weeks?

1660km

b How many kilometres do they travel in a year (52 weeks) if they don't miss a weekend? Use the space provided for your working.

21580km



$$52 \div 4 = 13$$

$$\begin{array}{r} 1660 \\ 13 \\ \hline 4980 \\ 16600 \\ \hline 21580 \end{array}$$

MiB 3
Card 40

Does the order matter?

1

a  Complete the following with a calculator.

$$132 + 991 = \underline{\quad 1123 \quad} \quad 991 + 132 = \underline{\quad 1123 \quad}$$

$$413 - 261 = \underline{\quad 152 \quad} \quad 261 - 413 = \underline{\quad -152 \quad}$$

b When you add numbers, do you get the same answer if the order of the numbers is changed?

Yes

c When you subtract numbers, do you get the same answer if the order of the numbers is changed?

No

d  Use a calculator to investigate: What type of answer do you always get when you subtract a larger number from a smaller number?

A negative number

2

a  Complete the following with a calculator.

$$26 \times 9 = \underline{\quad 234 \quad} \quad 9 \times 26 = \underline{\quad 234 \quad}$$

$$682 \div 2 = \underline{\quad 341 \quad} \quad 2 \div 682 = \underline{\quad \frac{1}{341} \text{ or } 0.00293255 \quad}$$

b When you multiply numbers, do you get the same answer if the order of the numbers is changed?

Yes

c When you divide numbers, do you get the same answer if the order of the numbers is changed?

No

d  Use a calculator to investigate: What type of answer do you always get when you divide a smaller number by a larger one?

A fraction or a decimal

Which operation first?

To make coffee in his coffee machine, Ahmed adds 2 spoons of coffee per person and 1 extra. How many spoons does he use to make coffee for 14 people? To solve this question, Faith wrote the number sentence:

$$1 + 14 \times 2$$

Does it matter if Faith adds before multiplying? Should she multiply first? Investigate this below.



1 Complete each calculation as directed. The first has been done for you.



9

a multiplication first

$$6 \times 7 + 2 = \underline{42 + 2} = 44$$

addition first

$$6 \times 7 + 2 = \underline{6 \times 9} = 54$$

b multiplication first

$$16 - 2 \times 4 = \underline{16 - 8} = 8$$

subtraction first

$$16 - 2 \times 4 = \underline{14 \times 4} = 56$$

c division first

$$12 + 6 \div 3 = \underline{12 + 2} = 14$$

addition first

$$12 + 6 \div 3 = \underline{18 \div 3} = 6$$

d division first

$$16 \div 4 - 2 = \underline{4 - 2} = 2$$

subtraction first

$$16 \div 4 - 2 = \underline{16 \div 2} = 8$$

2 Look at your answers in Question 1. Is it important which operation is completed first? Give a reason.

Yes, it is important. A different order of operations results in a different result.

3 Should Faith multiply or add first, to solve the question at the top of the page? Give a reason.

Faith should multiply first because 14 is the right number

that requires 2 spoons of coffee. If she adds 1 it will be 15.

4 There are 36 biscuits in a bag. Alina eats 4 biscuits and divides the remainder equally among her 4 children and their 4 friends. How many biscuits does each child receive?



a Write a single number sentence for this problem.

$$\underline{36 - 4 \div 4 + 4}$$

b Place a set of brackets () around the operation that should be completed first, and then solve the problem.

$$\underline{(36 - 4) \div (4 + 4) = 32 \div 8 = 4}$$

Problems with mixed operations

Write a single number sentence using brackets if needed and then solve each problem.

- 1 The 3 children from the Thomas family and the 4 children from the Mansuk family each received 8 stickers. How many stickers did they have altogether?

$$8 \times (3 + 4) = 8 \times 7 = 56 \text{ stickers altogether}$$

A set of brackets is used to show whether addition or subtraction should be completed first.

For example:

$$(4 + 5) \times 7$$

shows that we solve it as:

$$9 \times 7 = 63$$

While $4 + 5 \times 7$

shows that we solve it as:

$$4 + 35 = 39$$

- 2 Manuela sorted her collection of 120 red buttons into 10 equal piles. She placed one of the piles and 5 blue buttons into a plastic bag. How many buttons were in the plastic bag?



$$(120 \div 10) + 5 = 12 + 5 = 17 \text{ buttons in the bag.}$$

- 3 When making iceblocks at home, Maisy and Claire use one mould that makes 3 iceblocks and another mould that makes 6. They fill all the moulds using a total of 450 mL of cordial. How many mL of cordial are in each iceblock?



$$450 \div (3 + 6) = 450 \div 9 = 50 \text{ ml in each iceblock}$$

- 4 Dana baked 150 shortbread biscuits as a Christmas gift for her friends. The biscuits were so good that she and her brother Sean ate 6 of them. Dana then packed the remaining biscuits into 12 equal packs for her friends. How many biscuits were in each present?



$$(150 - 6) \div 12 = 144 \div 12 \text{ biscuits in each present.}$$

Finding prime numbers

The 'Sieve of Eratosthenes' is an ancient method for finding primes below a particular number. Eratosthenes lived in Cyrene from 275–195 BC. Besides developing his famous number sieve, he was the first to estimate accurately the diameter of Earth. He was also a director of the ancient library of Alexandria.

- 1 Use the internet or other resources to research how to use the 'Sieve of Eratosthenes'. Write down the directions below.

For a number series up to a certain number (for example 100),

to find the primes, start with the first prime (2) and

eliminate all multiples. Move to the next prime and repeat.

The next number which is prime will be the first number

which is not crossed out. Repeat this process until

your next number is greater than the biggest number in

your set (in this case 100).

- 2 Use the 100 grid provided and what you have learned about the 'Sieve of Eratosthenes' to find all the prime numbers up to 100.

The prime numbers from 1 to 100 are:

2, 3, 5, 7, 11, 13, 17, 19, 23

29, 31, 37, 41, 43, 47, 53

59, 61, 67, 71, 73, 79, 83, 89, 97

3



What is the largest 3-digit prime number?



The largest 3-digit prime number is

997

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



10

Use the space below to record your working and to explain how you arrived at this number as the answer.

1 ~~2~~ ~~3~~ ~~5~~ ~~7~~ ~~9~~ ~~11~~ 13 17 19 ~~21~~ 23 27 29 31 33 37 39 41 43 47 ~~49~~ 51 53 57 59 61 ~~63~~
 67 69 71 73 77 79 81 83 87 89 91 93 97 99 101 103 107 109 111 113 117 119 121
 123 127 129 131 133 137 139 141 143 147 149 151 153 157 159 161 163 167 169
 171 173 177 179 181 183 187 189 191 193 197 199 . . .

- I eliminated all even numbers and every number divisible by 2. Starting backwards from 999, 999 is divisible by 3, 997 is prime - not divisible by any of the primes.
 . . . 989 991 993 ~~995~~ ~~997~~ 999

MiB 3
Cards 19
and 35

Primes and composites

Prime numbers are numbers that have only two factors, themselves and the number 1. (The number 1 is NOT a prime number, as it has only one factor, itself.) 13 is a prime number as only 1 and 13 are factors.

Composite numbers are numbers with more than two factors. 6 is a composite number as its factors are 1, 2, 3 and 6.

- 1 Using mental strategies, place a circle around the numbers below that are prime, and a square around the numbers that are composite.

(11) (71) (211) [48] (2) [110] (59)
 [10] [15] [30] [44] [77] (67) [14]
 (43) [22] (31) [57] (23) [136] (503)

- 2 List the composite numbers from Question 1 in the table below, and then write out the factors for each number in the space provided.

	Composite numbers	Factors
a	48	2, 3, 6, 4, 16, 12, 24
b	110	2, 5, 10, 11, 22, 55, 110
c	10	2, 5
d	15	3, 5
e	30	2, 3, 5, 6, 15, 10
f	44	2, 4, 11, 22
g	77	7, 11
h	14	2, 7
i	22	2, 11
j	57	3, 19
k	136	2, 4, 8, 17, 34, 68

- 3 Complete the following divisions, and use your answer to decide if the statement is *true* or *false*.

- a $\frac{116}{4} = 29$ 4 is a factor of 116. True
 b $136 \div 5 = 27.2$ 5 is a factor of 136. False
 c $2 \overline{)733} = 366.5$ 2 is a factor of 733. False
 d $\frac{360}{12} = 30$ 12 is a factor of 360. True
 e $135 \div 23 = 5.8723$ 23 is a factor of 135. False
 f $9 \overline{)288} = 32$ 9 is a factor of 288. True
 g $\frac{986}{6} = 164.33$ 6 is a factor of 986. False

Changing fraction forms

1 Draw a diagram to show each mixed number and use it to help you write the improper fraction. The first one has been done for you.

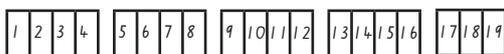
a $1\frac{1}{6} = \frac{7}{6}$



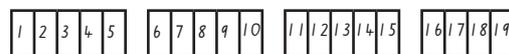
b $2\frac{1}{3} = \frac{7}{3}$



c $4\frac{3}{4} = \frac{19}{4}$



d $3\frac{4}{5} = \frac{19}{5}$



e $5\frac{1}{2} = \frac{11}{2}$



f $2\frac{5}{6} = \frac{\square}{6}$

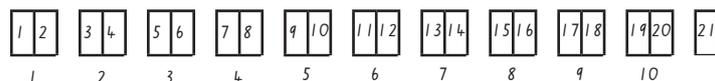


2 Draw a diagram to show each improper fraction and use it to help you write the mixed number in its lowest form. The first one is done for you.

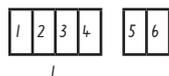
a $\frac{7}{3} = 2\frac{1}{3}$



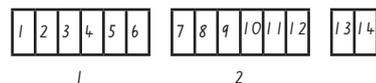
b $\frac{21}{2} = 10\frac{1}{2}$



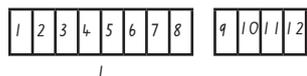
c $\frac{6}{4} = 1\frac{2}{4}$
 $= 1\frac{1}{2}$



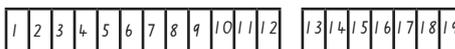
d $\frac{14}{6} = 2\frac{2}{6}$
 $= 2\frac{1}{3}$



e $\frac{12}{8} = 1\frac{4}{8}$
 $= 1\frac{2}{4}$



f $\frac{19}{12} = 1\frac{7}{12}$

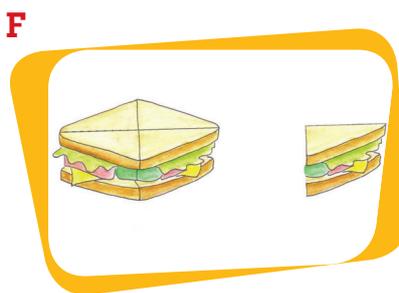
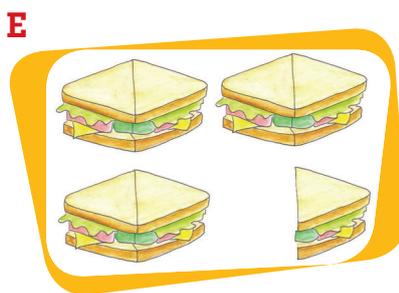
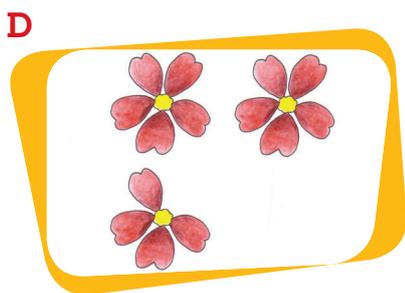
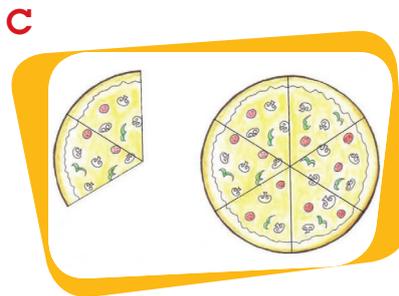
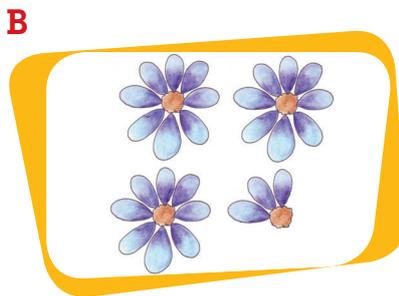
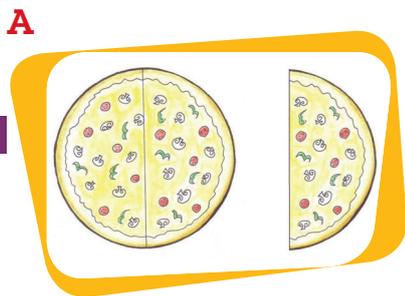


Mixed numbers and improper fractions

Use the pictures below to answer Questions 1 and 2.



11



1 Write the mixed numeral represented in each picture above.

A $1\frac{1}{2}$ **B** $3\frac{3}{8}$ **C** $1\frac{1}{3}$

D $2\frac{4}{5}$ **E** $3\frac{1}{2}$ **F** $1\frac{1}{4}$

2 Write the improper fraction represented in each picture above.

A $\frac{3}{2}$ **B** $\frac{27}{8}$ **C** $\frac{4}{3}$

D $\frac{14}{5}$ **E** $\frac{7}{2}$ **F** $\frac{5}{4}$

3 Giuseppe's Pizzeria cuts each pizza into 8 slices. Tony and his friends eat 43 slices of pizza on Friday night.



a How many pizzas do they eat?

$5\frac{3}{8}$ Pizzas

b What fraction of a pizza remains uneaten? How many slices is this?

$\frac{5}{8}$ of a pizza - five slices.

Converting fraction forms

- 1** Change the following improper fractions into mixed numbers in their lowest form, using a mental strategy.

a $\frac{23}{2} = 11 \frac{1}{2}$

b $\frac{32}{3} = 10 \frac{2}{3}$

c $\frac{21}{4} = 5 \frac{1}{4}$

d $\frac{26}{5} = 5 \frac{1}{5}$

e $\frac{22}{6} = 3 \frac{2}{3}$

f $\frac{53}{8} = 6 \frac{5}{8}$

- 2** Change the following mixed numbers into improper fractions using a mental strategy.

a $6 \frac{1}{2} = \frac{13}{2}$

b $2 \frac{1}{3} = \frac{7}{3}$

c $4 \frac{1}{4} = \frac{17}{4}$

d $6 \frac{5}{6} = \frac{41}{6}$

e $2 \frac{1}{6} = \frac{13}{6}$

f $1 \frac{3}{8} = \frac{11}{8}$

- 3** When Arianna packs lunch for her 2 children each day, she puts one muesli bar in each of their lunchboxes. The muesli bars she buys come in boxes of 8.



- a** If Arianna uses 73 muesli bars during a school term, how many boxes has she used?

$9 \frac{1}{8}$ boxes.

- b** What fraction of a box remains? How many muesli bars is this?

$\frac{7}{8}$ of a box - 7 muesli bars

- c** If a school term lasts 10 weeks, suggest a reason why Arianna has only used 73 muesli bars instead of 100.

Perhaps her children have been sick, or there have been public holidays.

- 4** Disposable razors come in packets of 12. Tran's father uses $29 \frac{7}{12}$ packets of razors in one year.



- a** How many individual razors has Tran's father used?

He has used 355 razors.

- b** Does Tran's father use one razor every day of the year? Give a reason for your answer.

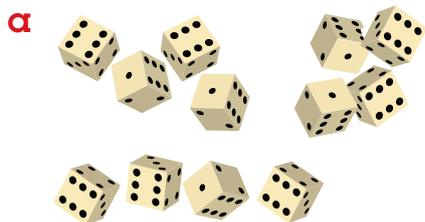
No - $355 < 365$ (number of days in the year)

- c** Suggest a reason why Tran's father does not use 365 razors in a year.

On some days he may forget to shave, or he uses the same razor twice.

Fractions of a group

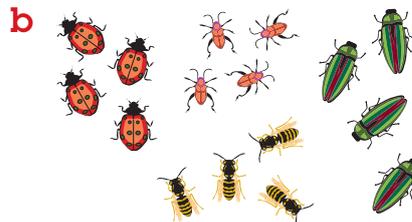
1 Use the diagrams to help you complete the mathematical statements.



$$\frac{1}{3} \text{ of } 12 = \underline{\quad 4 \quad}$$

$$\frac{3}{4} \text{ of } 12 = \underline{\quad 9 \quad}$$

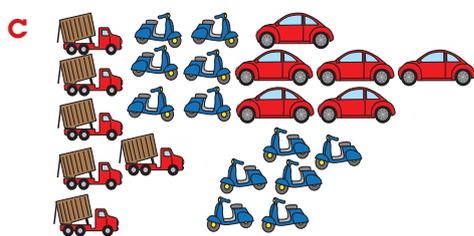
$$\frac{1}{6} \text{ of } 12 = \underline{\quad 2 \quad}$$



$$\frac{1}{2} \text{ of } 16 = \underline{\quad 8 \quad}$$

$$\frac{1}{4} \text{ of } 16 = \underline{\quad 4 \quad}$$

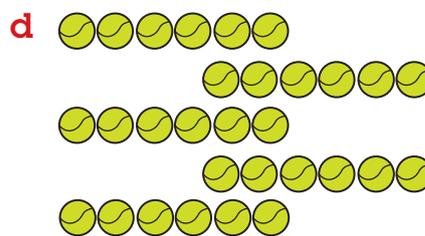
$$\frac{3}{8} \text{ of } 16 = \underline{\quad 6 \quad}$$



$$\frac{5}{12} \text{ of } 24 = \underline{\quad 10 \quad}$$

$$\frac{5}{6} \text{ of } 24 = \underline{\quad 20 \quad}$$

$$\frac{5}{8} \text{ of } 24 = \underline{\quad 15 \quad}$$

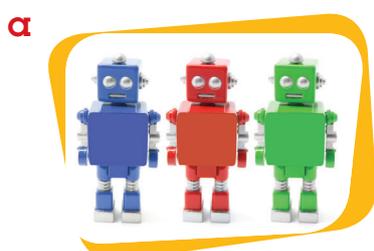


$$\frac{2}{3} \text{ of } 30 = \underline{\quad 20 \quad}$$

$$\frac{4}{5} \text{ of } 30 = \underline{\quad 24 \quad}$$

$$\frac{9}{10} \text{ of } 30 = \underline{\quad 27 \quad}$$

2 Mario invites five friends to a party. How many of each item does each person receive if they are shared equally among Mario and his friends?



18 toy robots
 $\underline{\quad 3 \text{ toy robots} \quad}$



24 toy cars
 $\underline{\quad 4 \text{ toy cars} \quad}$



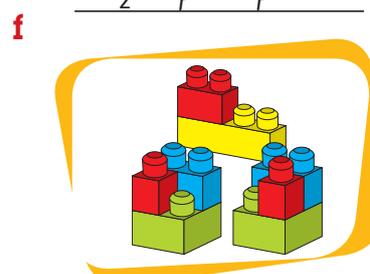
21 lumps of plasticine
 $\underline{\quad 3\frac{1}{2} \text{ lumps of plasticine} \quad}$



54 finger puppets
 $\underline{\quad 9 \text{ finger puppets} \quad}$



78 plastic bugs
 $\underline{\quad 13 \text{ plastic bugs} \quad}$



216 blocks
 $\underline{\quad 36 \text{ blocks} \quad}$

Using fractions of a group

1 Use the clock face to help you find how many minutes are in:

a $\frac{1}{4}$ of an hour 15 min

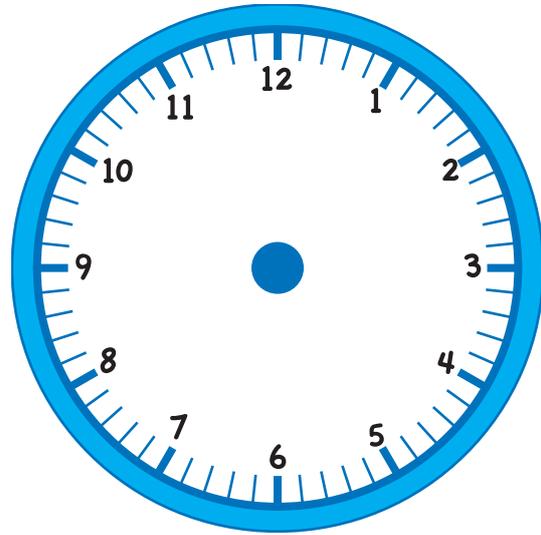
b $\frac{2}{3}$ of an hour 40 min

c $\frac{11}{12}$ of an hour 55 min

d $1\frac{1}{2}$ hours 90 min

e $2\frac{1}{6}$ hours 130 min

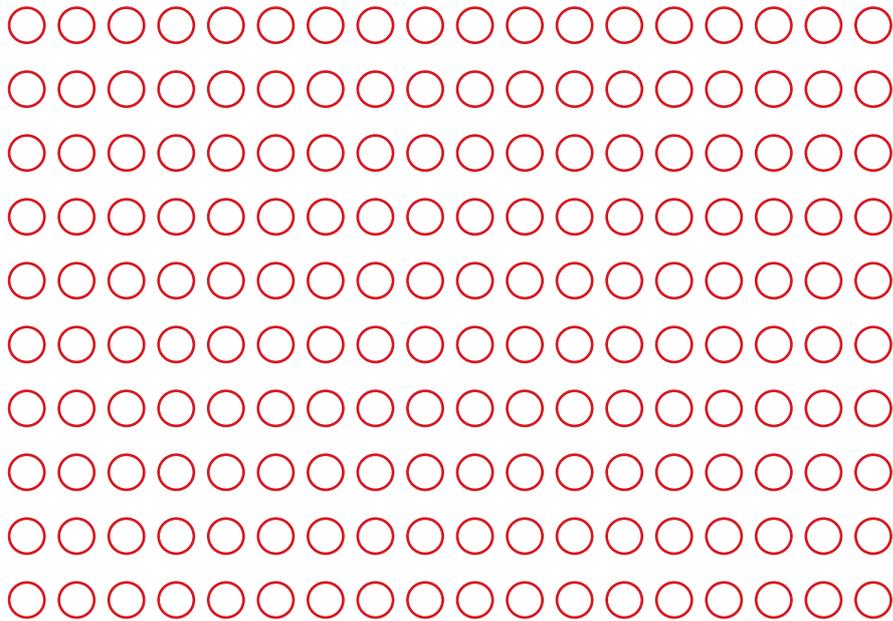
f $3\frac{9}{10}$ hours 234 min



2



Use the diagram below and a calculator to find these fractions of 180.



Remember!

$\frac{2}{3}$ of 180 is the same as $\frac{2}{3} \times 180$. This is entered into the calculator as: $2 \div 3 \times 180$.

a $\frac{1}{2}$ of 180 = 90

b $\frac{1}{3}$ of 180 = 60

c $\frac{3}{4}$ of 180 = 135

d $\frac{3}{5}$ of 180 = 108

e $\frac{5}{6}$ of 180 = 150

f $\frac{3}{10}$ of 180 = 54

g $\frac{11}{12}$ of 180 = 165



Equivalent fractions

Remember!

Equivalent fractions are fractions that name the same number or amount.

For example:

$$\frac{1}{2} = \frac{2}{4} = \frac{3}{6} = \frac{4}{8} = \frac{5}{10} = \frac{6}{12}$$

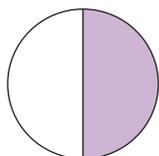
You can change from one equivalent fraction to another by multiplying or dividing both the numerator and denominator by the same number.

For example:

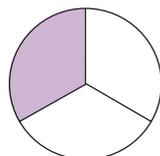
$$\frac{4}{12} \text{ is reduced by } \frac{4 \div 4}{12 \div 4} = \frac{1}{3}$$

- 1** Match each of the fractions listed below to its lowest form. Write the fractions in the space provided under each diagram.

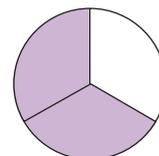
$\frac{3}{6}$	$\frac{8}{12}$	$\frac{2}{12}$	$\frac{75}{100}$	$\frac{5}{10}$	$\frac{8}{32}$	$\frac{20}{100}$	$\frac{5}{50}$	$\frac{15}{20}$	$\frac{4}{12}$	$\frac{4}{24}$	$\frac{10}{100}$
$\frac{9}{12}$	$\frac{2}{6}$	$\frac{50}{100}$	$\frac{2}{10}$	$\frac{2}{8}$	$\frac{10}{15}$	$\frac{7}{21}$	$\frac{25}{100}$	$\frac{5}{25}$	$\frac{6}{60}$	$\frac{10}{60}$	$\frac{20}{30}$



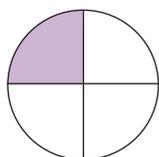
$$\frac{1}{2} \quad \frac{3}{6} \quad \frac{5}{10} \quad \frac{50}{100}$$



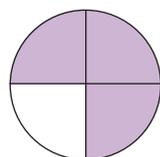
$$\frac{1}{3} \quad \frac{4}{12} \quad \frac{2}{6} \quad \frac{7}{21}$$



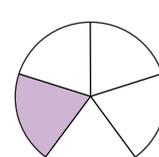
$$\frac{2}{3} \quad \frac{8}{12} \quad \frac{10}{15} \quad \frac{20}{30}$$



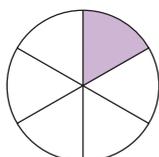
$$\frac{1}{4} \quad \frac{8}{36} \quad \frac{2}{8} \quad \frac{25}{100}$$



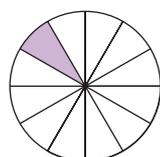
$$\frac{3}{4} \quad \frac{75}{100} \quad \frac{15}{20} \quad \frac{9}{12}$$



$$\frac{1}{5} \quad \frac{20}{100} \quad \frac{2}{10} \quad \frac{5}{25}$$

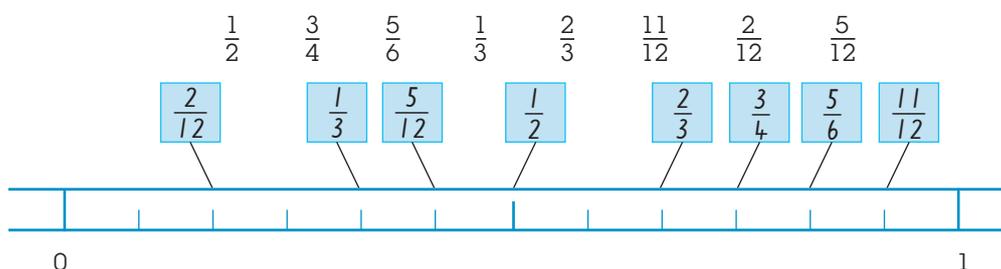


$$\frac{1}{6} \quad \frac{2}{12} \quad \frac{4}{24} \quad \frac{10}{60}$$



$$\frac{1}{10} \quad \frac{5}{50} \quad \frac{10}{100} \quad \frac{6}{60}$$

- 2** Use equivalent fractions to help you place these fractions on the number line in the correct location.



Equivalent mixed numbers

1 a Draw a diagram to represent each fraction in the space provided.

<p>i $1\frac{1}{2}$</p>	<p>ii $1\frac{9}{12}$</p>	<p>iii $1\frac{1}{3}$</p>	<p>iv $1\frac{8}{12}$</p>	<p>v $1\frac{2}{8}$</p>
<p>vi $1\frac{2}{3}$</p>	<p>vii $1\frac{1}{4}$</p>	<p>viii $1\frac{6}{8}$</p>	<p>ix $1\frac{5}{10}$</p>	<p>x $1\frac{4}{12}$</p>
<p>xi $1\frac{2}{6}$</p>	<p>xii $1\frac{3}{6}$</p>	<p>xiii $1\frac{4}{6}$</p>	<p>xiv $1\frac{3}{12}$</p>	<p>xv $1\frac{3}{4}$</p>

b Use your diagrams to identify the fractions that are equivalent. Write the letters of the equivalent fractions below.

i, ix, xii ii, xv, viii iii, x, xi iv, xii, vi v, viii, xiv

2 Draw lines to connect the fractions which are equivalent (equal to each other).

$1\frac{1}{2}$ $1\frac{5}{20}$ $2\frac{1}{3}$ $1\frac{5}{6}$
 $1\frac{10}{12}$ $1\frac{3}{4}$ $2\frac{3}{4}$ $2\frac{3}{18}$
 $2\frac{4}{12}$ $1\frac{6}{8}$ $2\frac{3}{4}$ $2\frac{3}{18}$
 $2\frac{4}{12}$ $2\frac{1}{6}$ $1\frac{1}{4}$ $2\frac{12}{16}$
 $2\frac{2}{16}$ $1\frac{3}{6}$ $2\frac{1}{8}$ $2\frac{12}{16}$

Ordering fractions greater than 1

1 Use $<$, $>$ or $=$ to make each statement true.

a $1\frac{1}{2}$ $<$ $1\frac{3}{4}$

b $1\frac{2}{3}$ $>$ $1\frac{4}{12}$

c $1\frac{9}{12}$ $>$ $1\frac{1}{3}$

d $1\frac{9}{10}$ $>$ $1\frac{4}{5}$

2 Circle the fraction that is smaller.

a $(1\frac{1}{3})$ OR $4\frac{2}{3}$

b $\frac{14}{4}$ OR $(3\frac{1}{4})$

c $(\frac{37}{5})$ OR $8\frac{2}{5}$

d $(5\frac{2}{6})$ OR $7\frac{5}{6}$

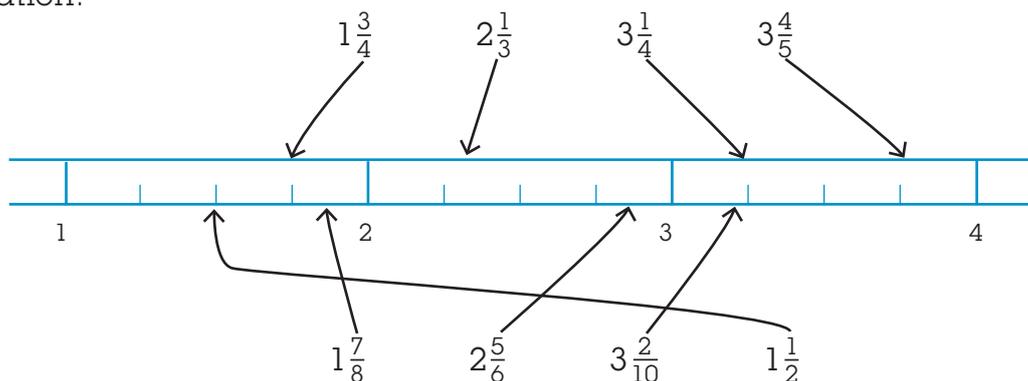
3 Rewrite each set of fractions in order, from largest to smallest.

a $\frac{14}{3}$ $3\frac{1}{3}$ $\frac{17}{3}$ $6\frac{2}{3}$ $3\frac{1}{3}$, $\frac{14}{3}$, $\frac{17}{3}$, $6\frac{2}{3}$

b $8\frac{4}{5}$ $\frac{39}{5}$ $2\frac{4}{5}$ $7\frac{2}{5}$ $2\frac{4}{5}$, $7\frac{2}{5}$, $\frac{39}{5}$, $8\frac{4}{5}$

c $\frac{19}{6}$ $4\frac{1}{6}$ $\frac{27}{6}$ $3\frac{5}{6}$ $\frac{19}{6}$, $3\frac{5}{6}$, $4\frac{1}{6}$, $\frac{27}{6}$

4 Place each fraction on the number line by drawing a line to its correct location.



5 At Easter Chloe, Nicholas and Jason all received some bags of 12 chocolate Easter eggs. On Easter Sunday, Chloe ate $3\frac{2}{3}$ of her bags, Nicholas ate $3\frac{5}{6}$ of his bags and Jason ate $3\frac{7}{12}$ of his bags.



a Who ate the most Easter eggs on Easter Sunday?

Nicholas

b How many Easter eggs did each child eat on Easter Sunday?

Chloe ate 44, Nicholas ate 46 and Jason ate 43.

Addition of whole numbers and fractions

Remember!

When adding a whole number and a fraction, the result is a mixed number.

For example:

$$1 + \frac{1}{2} = 1\frac{1}{2} \quad 2 + \frac{2}{3} = 2\frac{2}{3} \quad 7 + \frac{11}{12} = 7\frac{11}{12}$$

1 Complete each of the following additions.

a $3 + \frac{3}{10} = \frac{3\frac{3}{10}}$ **b** $8 + \frac{4}{5} = \frac{8\frac{4}{5}}$

c $6 + \frac{2}{3} = \frac{6\frac{2}{3}}$ **d** $10 + \frac{5}{6} = \frac{10\frac{5}{6}}$

e $12 + \frac{3}{8} = \frac{12\frac{3}{8}}$ **f** $22 + \frac{11}{12} = \frac{22\frac{11}{12}}$



2 Keith has 3 unopened cartons of 12 soft drink cans as well as an open carton with 8 cans. For his party he buys another 5 cartons.

a How many cartons of soft drink does Keith have for his party?

$$8\frac{2}{3} \text{ cartons}$$

b How many cans of soft drink does Keith have for his party? Write your answer as an improper fraction.

$$\frac{26}{3} \text{ cartons} = \frac{26}{3} \times 12 = 104 \text{ cans}$$

c If there are 30 people at the party and they all drink 3 cans each, how many cartons of soft drink are drunk? Find the answer by writing a multiplication number sentence.

$$\text{Cans drunk} = 3 \times 30 = 90$$

$$\text{Cartons drunk} = \frac{90}{12} = 7\frac{6}{12} = 7\frac{1}{2} \text{ cartons drunk}$$

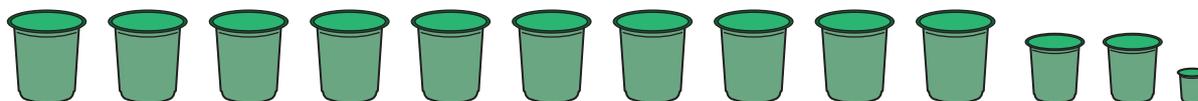
d How many cartons of soft drink are left over from the party? Write your answer, first as an improper fraction and then as a mixed number if required.

$$\text{Cans left} = 104 - 90 = 14, \text{ Cartons left} = \frac{14}{12} = 1\frac{2}{12} = 1\frac{1}{6} \text{ cartons}$$

3 Jessica used $4\frac{1}{2}$ cups of rice bubbles to make chocolate crackles, $3\frac{1}{2}$ cups to make white Christmas and $3\frac{1}{4}$ cups to make apricot bubble balls.



a Draw a diagram to show how many cups of rice bubbles Jessica used.

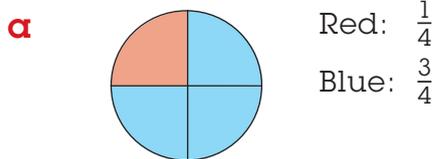


b How many cups of rice bubbles did Jessica use altogether?

$$1\frac{11}{4} \text{ cups}$$

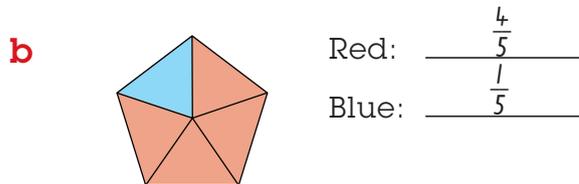
Subtraction of fractions from 1

1 For each of the following diagrams, write the fraction that has been shaded blue, the fraction that has been shaded red and complete the two mathematical statements. The first one has been one for you.



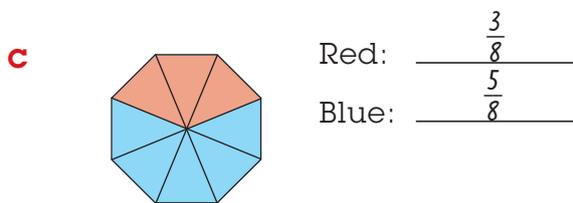
$$1 - \frac{1}{4} = \frac{3}{4}$$

$$1 - \frac{3}{4} = \frac{1}{4}$$



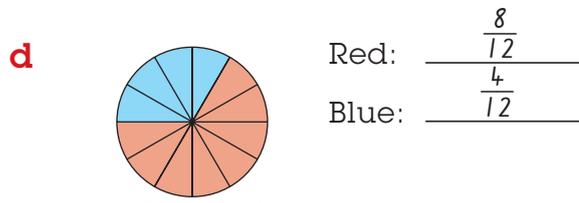
$$1 - \frac{1}{5} = \frac{4}{5}$$

$$1 - \frac{4}{5} = \frac{1}{5}$$



$$1 - \frac{3}{8} = \frac{5}{8}$$

$$1 - \frac{5}{8} = \frac{3}{8}$$



$$1 - \frac{8}{12} = \frac{4}{12}$$

$$1 - \frac{4}{12} = \frac{8}{12}$$

2 Rachael's family had a new loaf of bread. After having breakfast and making sandwiches for school, $\frac{2}{5}$ of the loaf remained. What fraction of the loaf was used?

$\frac{3}{5}$ of the loaf was used.



3 A packet of sultanas contains 6 boxes. If Mina and Skylar have one box of sultanas each, what fraction of the packet remains?

$\frac{6-2}{6} = \frac{2}{3}$ of the packet

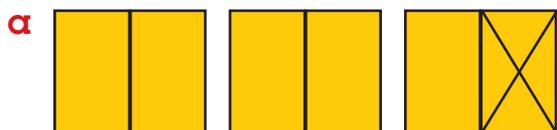
4 During the halftime break of his soccer game, Aidan drinks $\frac{3}{4}$ of a bottle of water. How much remains?

$\frac{1}{4}$ of the bottle.

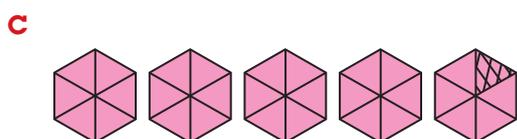


Subtraction of fractions from whole numbers

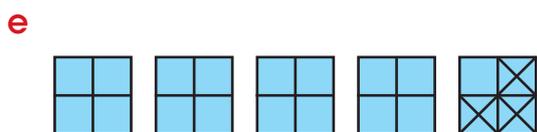
1 Using the pictures, complete the mathematical statements. The first one has been done for you.



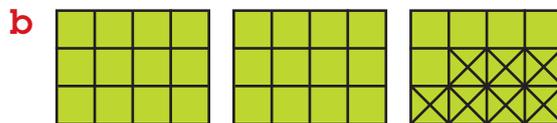
$$3 - \frac{1}{2} = 2\frac{1}{2}$$



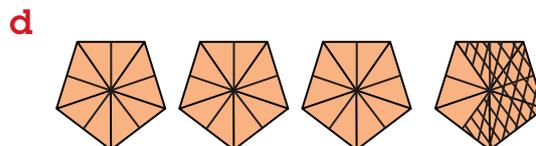
$$5 - \frac{1}{6} = 4\frac{5}{6}$$



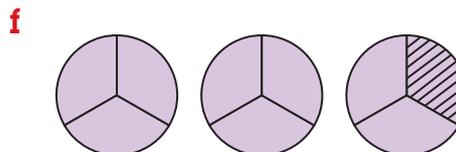
$$5 - \frac{3}{4} = 4\frac{1}{4}$$



$$3 - \frac{7}{12} = 2\frac{5}{12}$$

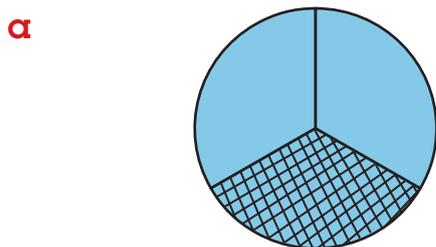


$$4 - \frac{7}{10} = 3\frac{3}{10}$$

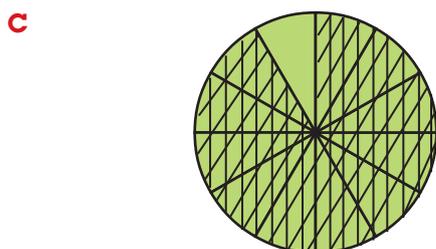


$$3 - \frac{1}{3} = 2\frac{2}{3}$$

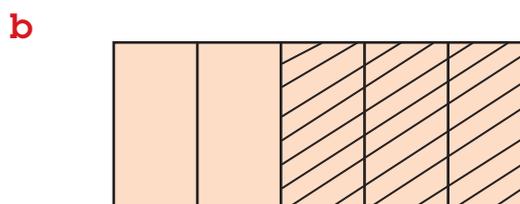
2 Complete the following mathematical statements. Use the shape provided to help you if necessary.



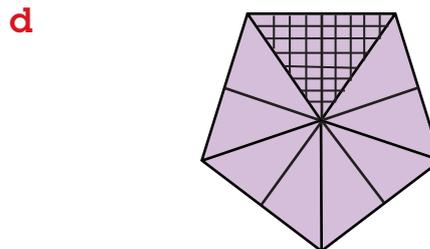
$$3 - \frac{1}{3} = 2\frac{2}{3}$$



$$2 - \frac{11}{12} = 1\frac{1}{12}$$



$$2 - \frac{3}{5} = 1\frac{2}{5}$$



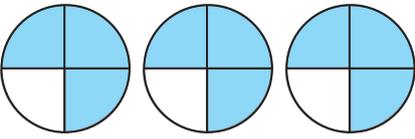
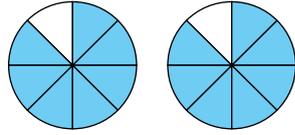
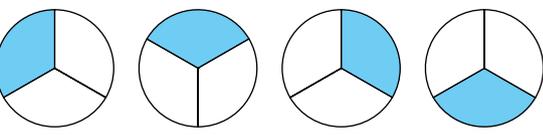
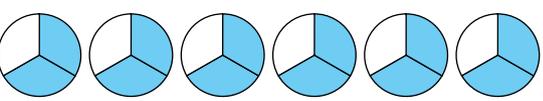
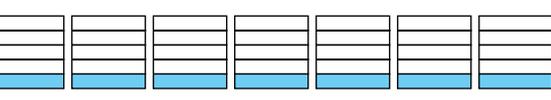
$$4 - \frac{2}{10} = 3\frac{8}{10} = 3\frac{4}{5}$$

Repeated addition and multiplication

Remember!

Multiplication is the repeated addition of groups of the same size.

- 1 a** Write each multiplication as a repeated addition.
 - b** Draw a diagram to represent each addition.
 - c** Use the diagram to help you find the answer as an improper fraction.
 - d** Change your improper fraction to a mixed number in its lowest form.
- The first one has been done for you.

$3 \times \frac{3}{4}$	$\frac{3}{4} + \frac{3}{4} + \frac{3}{4}$		$\frac{9}{4}$	$2\frac{1}{4}$
$2 \times \frac{7}{8}$	$\frac{7}{8} + \frac{7}{8}$		$\frac{14}{8}$	$1\frac{3}{4}$
$4 \times \frac{1}{3}$	$\frac{1}{3} + \frac{1}{3} + \frac{1}{3} + \frac{1}{3}$		$\frac{4}{3}$	$1\frac{1}{3}$
$5 \times \frac{1}{4}$	$\frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4}$		$\frac{5}{4}$	$1\frac{1}{4}$
$6 \times \frac{2}{3}$	$\frac{2}{3} + \frac{2}{3} + \frac{2}{3} + \frac{2}{3} + \frac{2}{3} + \frac{2}{3}$		$\frac{12}{3}$	4
$7 \times \frac{1}{5}$	$\frac{1}{5} + \frac{1}{5} + \frac{1}{5} + \frac{1}{5} + \frac{1}{5} + \frac{1}{5} + \frac{1}{5}$		$\frac{7}{5}$	$1\frac{2}{5}$

- 2** Write the answer to each of the multiplications as an improper fraction and as a mixed number in its lowest form. The first one is done for you.

$$3 \times \frac{3}{4} = \frac{9}{4} = 2\frac{1}{4}$$

$$4 \times \frac{1}{3} = \frac{4}{3} = 1\frac{1}{3}$$

$$6 \times \frac{2}{3} = \frac{12}{3} = 4$$

$$2 \times \frac{7}{8} = \frac{14}{8} = 1\frac{3}{4}$$

$$5 \times \frac{1}{4} = \frac{5}{4} = 1\frac{1}{4}$$

$$7 \times \frac{1}{5} = \frac{7}{5} = 1\frac{2}{5}$$

Whole number multiplication of fractions

- 1 Write each multiplication as a repeated addition. Calculate the answer and write any improper fractions as mixed numbers.

a $2 \times \frac{7}{12} = \frac{7}{12} + \frac{7}{12} = 1\frac{1}{6}$

b $3 \times \frac{2}{3} = \frac{2}{3} + \frac{2}{3} + \frac{2}{3} = 2$

c $2 \times \frac{5}{6} = \frac{5}{6} + \frac{5}{6} = 1\frac{2}{3}$

d $4 \times \frac{5}{8} = \frac{5}{8} + \frac{5}{8} + \frac{5}{8} + \frac{5}{8} = 2\frac{1}{2}$



14

When multiplying a fraction by a whole number, the **numerator** is multiplied by the whole number. If the answer is an improper fraction, it is normally changed to a mixed number.

For example:

$$3 \times \frac{5}{6} = \frac{(3 \times 5)}{6} = \frac{15}{6} = 2\frac{3}{6} = 2\frac{1}{2}$$

- 2 Complete these multiplications.

a $8 \times \frac{4}{5} = \frac{32}{5} = 6\frac{2}{5}$

b $9 \times \frac{5}{12} = \frac{45}{12} = 3\frac{3}{4}$

c $5 \times \frac{9}{10} = \frac{45}{10} = 4\frac{1}{2}$

d $16 \times \frac{2}{3} = \frac{32}{3} = 10\frac{2}{3}$

e $10 \times \frac{3}{4} = \frac{30}{4} = 7\frac{1}{2}$

f $15 \times \frac{1}{6} = \frac{15}{6} = 2\frac{1}{2}$

- 3 Jian eats $\frac{2}{3}$ of an apple every day.

a How many apples does Jian eat each week? $7 \times \frac{2}{3} = \frac{14}{3} = 4\frac{2}{3}$

b How many apples would Jian eat during July? $31 \times \frac{2}{3} = \frac{62}{3} = 20\frac{2}{3}$

- c  How many apples does Jian eat each year (365 days)?

$$365 \times \frac{2}{3} = \frac{730}{3} = 243\frac{1}{3}$$

- 4 Ari's remote-control car takes 4 batteries and the control takes 3. Ari's mother buys batteries in packs of 12. Ari needs to replace all the batteries every week.

- a What fraction of a battery pack does Ari use each week?

$$\frac{(4 + 3)}{12} = \frac{7}{12}$$

- b How many packs of batteries does Ari use in a 10-week school term?

$$\frac{7}{12} \times 10 = \frac{70}{12} = 5\frac{5}{6}$$

- c  How many packs of batteries does he use in a year (52 weeks)?

$$\frac{7}{12} \times 52 = \frac{364}{12} = 30\frac{1}{3}$$



Adding fractions

When adding fractions that have different denominators, use equivalent fractions to change the smaller denominator into the larger one. Change quarters into eighths; change thirds into sixths or twelfths. The fractions can then be added together easily, as they have the same denominator.

For example:

$$\begin{aligned} \frac{1}{3} + \frac{5}{6} &= \frac{2}{6} + \frac{5}{6} \\ &= \frac{7}{6} \\ &= 1\frac{1}{6} \end{aligned}$$

- 1 Use diagrams to help you complete the following additions. The first one has been done for you.

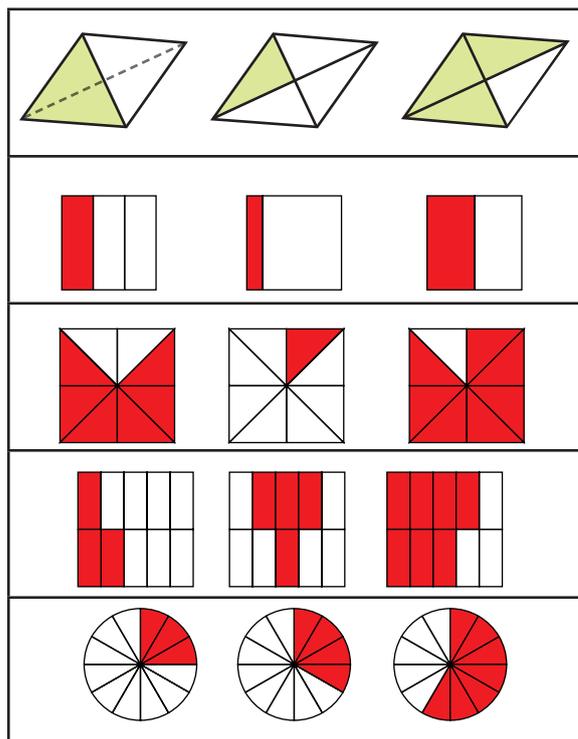
a $\frac{1}{2} + \frac{1}{4} = \frac{2}{4} + \frac{1}{4} = \frac{3}{4}$

b $\frac{1}{3} + \frac{1}{6} = \frac{2}{6} + \frac{1}{6} = \frac{3}{6}$

c $\frac{3}{4} + \frac{1}{8} = \frac{6}{8} + \frac{1}{8} = \frac{7}{8}$

d $\frac{3}{10} + \frac{2}{5} = \frac{3}{10} + \frac{4}{10} = \frac{7}{10}$

e $\frac{3}{12} + \frac{1}{3} = \frac{3}{12} + \frac{4}{12} = \frac{7}{12}$



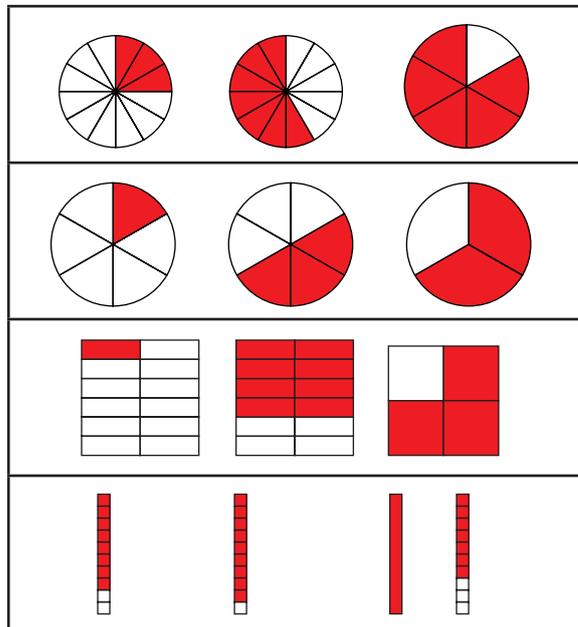
- 2 Complete each of the following additions. Use the space provided to draw any diagrams you need to help you.

a $\frac{1}{4} + \frac{7}{12} = \frac{3}{12} + \frac{7}{12} = \frac{10}{12}$

b $\frac{1}{6} + \frac{1}{2} = \frac{1}{6} + \frac{3}{6} = \frac{4}{6}$

c $\frac{1}{12} + \frac{2}{3} = \frac{1}{12} + \frac{8}{12} = \frac{9}{12}$

d $\frac{4}{5} + \frac{9}{10} = \frac{8}{10} + \frac{9}{10} = \frac{17}{10}$



Subtracting fractions

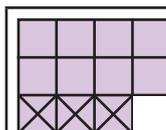
To subtract fractions with different denominators, you also use equivalent fractions. Change the fraction with the smaller denominator into a fraction that has the larger denominator. Change fifths into tenths.

For example:

$$\frac{1}{5} + \frac{1}{10} = \frac{2}{10} + \frac{1}{10} = \frac{3}{10}$$

1 Draw diagrams to help you complete the following subtractions. The first one has been done for you.

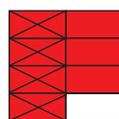
a $\frac{11}{12} - \frac{1}{4} = \frac{11}{12} - \frac{3}{12} = \frac{8}{12} = \frac{2}{3}$



b $\frac{4}{5} - \frac{1}{10} = \frac{8}{10} - \frac{1}{10} = \frac{7}{10}$



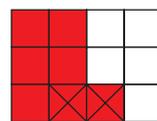
c $\frac{7}{8} - \frac{1}{2} = \frac{7}{8} - \frac{4}{8} = \frac{3}{8}$



d $\frac{5}{6} - \frac{1}{3} = \frac{5}{6} - \frac{2}{6} = \frac{3}{6} = \frac{1}{2}$



e $\frac{7}{12} - \frac{1}{6} = \frac{7}{12} - \frac{2}{12} = \frac{5}{12}$



2 Complete each of the following additions. Use the space provided to draw any diagrams you need to help you.

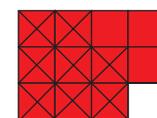
a $\frac{9}{10} - \frac{3}{5} = \frac{9}{10} - \frac{6}{10} = \frac{3}{10}$



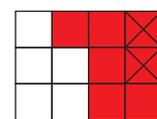
b $\frac{3}{4} - \frac{1}{8} = \frac{6}{8} - \frac{1}{8} = \frac{5}{8}$



c $\frac{11}{12} - \frac{2}{3} = \frac{11}{12} - \frac{8}{12} = \frac{3}{12} = \frac{1}{4}$



d $\frac{7}{12} - \frac{1}{6} = \frac{7}{12} - \frac{2}{12} = \frac{5}{12}$



Addition and subtraction of fractions

- 1** When Noah packs his dishwasher after breakfast, it is $\frac{1}{4}$ full. After lunch he adds another $\frac{3}{8}$ of a load.



15

- a** What fraction of a load does his dishwasher have after lunch?

$$\frac{5}{8}$$

- b** What fraction remains for the dishes from dinner?

$$\frac{3}{8}$$

- c** How does this space for the dinner dishes compare to the space taken by the breakfast and lunch dishes?

The same as lunch, and $\frac{1}{8}$ more than breakfast.

- 2** Aneko measures her rumpus room and finds $\frac{1}{3}$ of the floor area is being used by furniture and another $\frac{3}{12}$ of the floor area is being used by her children's toys.



- a** What fraction of the floor area in the rumpus room has been used?

$$\frac{7}{12}$$

- b** What fraction of the floor area remains vacant?

$$\frac{5}{12}$$

- 3** Nahla went on a trip overseas to visit her grandchildren. When she left Australia, she had only $\frac{1}{12}$ of her baggage empty. In the suitcases were presents for her grandchildren. They took up $\frac{1}{2}$ of the total space in her baggage. While she was visiting them, she purchased some gifts for her family in Australia, which took up $\frac{1}{3}$ of the total space in her baggage.



- a** When Nahla started her trip, how much space in her baggage was being used?

$\frac{11}{12}$ of her baggage was being used.

- b** How much of the space in Nahla's baggage was being used for her clothing and personal items?

$\frac{5}{12}$ was being used for clothing and personal items.

- c** When Nahla returned to Australia, how much space in her luggage was being used?

$\frac{3}{4}$ of her luggage was being used.

MiB 3
Card 60

Decimals

- 1 Place each of the numbers into the place value table and write the place value of the number shown in bold.

Number	Hundreds	Tens	Ones	Decimal point	Tenths	Hundredths	Thousandths	Place value
185.895	1	8	5	▪	8	9	5	Hundreds
20 6 .056	2	0	6	▪	0	5	6	Ones
54. 09		5	4	▪	0	9		Hundredths
841. 7	8	4	1	▪	7			Tenths

- 2 Write each of these decimals as a fraction.

a $0.6 = \frac{3}{5}$

b $0.27 = \frac{27}{100}$

c $0.153 = \frac{153}{1000}$

d $0.904 = \frac{904}{1000}$

e $0.084 = \frac{84}{1000}$

f $0.002 = \frac{2}{1000}$

- 3 Write each of these fractions as a decimal.

a $\frac{9}{10} = 0.9$

b $\frac{54}{100} = 0.54$

c $\frac{294}{1000} = 0.294$

d $\frac{108}{1000} = 0.108$

e $\frac{63}{1000} = 0.063$

f $\frac{4}{1000} = 0.004$

- 4 Six cups were filled to the rim with juice. The amounts of juice they held are shown below.

Cup 1 0.412 L

Cup 2 0.157 L

Cup 3 0.204 L

Cup 4 0.389 L

Cup 5 0.351 L

Cup 6 0.223 L



- a Which cup held the most juice?

_____ Cup 1 _____

- b Place the cups in order from the one with the greatest capacity to the one with the least.

_____ 1, 4, 5, 6, 3, 2 _____

Multiplying decimals by tens

1

a



Use a calculator to help you complete the following table.

	154.295	856.42	25.056	725.6
$\times 10$	1542.95	8564.2	250.56	7256
$\times 100$	15429.5	85642	2505.6	72560
$\times 1000$	154295	856420	25056	725600
$\div 10$	15.4295	85.642	2.5056	72.56
$\div 100$	1.54295	8.5642	0.25056	7.256
$\div 1000$	0.154295	0.85642	0.025056	0.7256

- b What happens to the place value of the numerals shown in bold as you multiply by 10, 100 or 1000?

*It moves left one position if multiplied by 10, two positions if multiplied by 100,
and three positions if multiplied by 1000.*

- c What happens to the place value of the numerals shown in bold as you divide by 10, 100 or 1000?

*It moves right one position if divided by 10, two position if divided by 100,
and three position if divided by 1000.*

- d Complete the following without using a calculator.

i $185.16 \times 10 =$ 1851.6

ii $472.6 \times 100 =$ 47260

iii $610.15 \times 1000 =$ 610150

iv $42.842 \div 10 =$ 4.2842

v $45.248 \div 100 =$ 0.45248

vi $9.574 \div 1000 =$ 0.009574

2

A school holiday program had 100 children attending each day. Calculate the following:

- a Each child paid \$12.50 to go to a movie. How much money was spent?

\$1250

- b Each child was given 10 lollies. Each lolly cost \$0.32. How much was spent on lollies?

$100 \times 10 \times 0.32 = \320

Adding decimal numbers

When adding decimal numbers that have a different number of decimal places, line up the decimal points with each other. This ensures that the place values will be aligned. Place tenths under tenths, hundredths under hundredths, etc.

It may help to add zeros (0) to any spaces on the right of the decimal point.

For example: $2.731 + 1.56$ is written as:

$$\begin{array}{r} 2.731 \\ 1.560 + \\ \hline 4.291 \end{array}$$



16

- 1** Rewrite each addition so that the numbers are correctly aligned according to place value.

a

$$\begin{array}{r} 0.2 \\ + 27.83 \\ \hline \end{array} \quad \begin{array}{r} 0.20 \\ + 27.83 \\ \hline 28.03 \end{array}$$

b

$$\begin{array}{r} 10.245 \\ + 5.12 \\ \hline \end{array} \quad \begin{array}{r} 10.245 \\ + 5.120 \\ \hline 15.365 \end{array}$$

c

$$\begin{array}{r} 32.53 \\ + 102.9 \\ \hline \end{array} \quad \begin{array}{r} 32.53 \\ + 102.90 \\ \hline 135.43 \end{array}$$

d

$$\begin{array}{r} 19.465 \\ + 8.142 \\ \hline \end{array} \quad \begin{array}{r} 19.465 \\ + 8.142 \\ \hline 27.607 \end{array}$$

e

$$\begin{array}{r} 24.84 \\ + 942.185 \\ \hline \end{array} \quad \begin{array}{r} 24.840 \\ + 942.185 \\ \hline 967.025 \end{array}$$

f

$$\begin{array}{r} 842.185 \\ + 18.249 \\ \hline \end{array} \quad \begin{array}{r} 842.185 \\ + 18.249 \\ \hline 860.434 \end{array}$$

- 2** Calculate the answer to the following additions.

a

$$\begin{array}{r} 185.296 \\ + 52.55 \\ \hline 237.846 \end{array}$$

b

$$\begin{array}{r} 52.956 \\ + 84.9 \\ \hline 137.856 \end{array}$$

c

$$\begin{array}{r} 96.4 \\ + 524.956 \\ \hline 621.356 \end{array}$$

d

$$\begin{array}{r} 842.08 \\ + 6.167 \\ \hline 848.247 \end{array}$$

- 3** Calculate the total mass of fruit and vegetables that each person bought.

<p>Ann: 1.74 kg apples and 0.923 kg pears</p> $\begin{array}{r} 1.740 \\ + 0.923 \\ \hline 2.663 \end{array}$ <p>Total mass = 2.663 kg</p>	<p>Raj: 3.5 kg potatoes and 0.215 kg chillies</p> $\begin{array}{r} 3.500 \\ + 0.215 \\ \hline 3.715 \end{array}$ <p>Total mass = 3.715 kg</p>	<p>Zane: 0.902 kg mushrooms and 1.5 kg bananas</p> $\begin{array}{r} 0.902 \\ + 1.500 \\ \hline 2.402 \end{array}$ <p>Total mass = 2.402 kg</p>
--------------------------------------------------------------------------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------------------------------------------------

MiB 3
Cards 15
and 16

Adding and subtracting decimals

- 1 Seung added these decimal numbers together, but did not get the correct answer.

$$\begin{array}{r} 5.07 \\ 182.6 \\ \hline 689.6 \end{array}$$

- a Explain what Seung has done incorrectly.

She has not lined up the decimal points, and therefore the units, correctly.

- b Rewrite the addition and find the correct answer.

$$\begin{array}{r} 5.07 \\ +182.60 \\ \hline 187.67 \end{array}$$

Correct answer is 187.67

- 2 Calculate the total cost of the goods listed on each shopping list.



List 1 \$28.12



List 2 \$14.25



List 3 \$8.42

- 3 Adrian bought 2 pieces of timber, that both measured 4 m, from the hardware store. From the first piece of timber he cut 2 lengths; 1.23 m and 2.545 m. From the second piece of timber he cut a single length of 3.065 m. Use the space provided for your working.

- a What was the combined length of timber that was cut from the first piece?

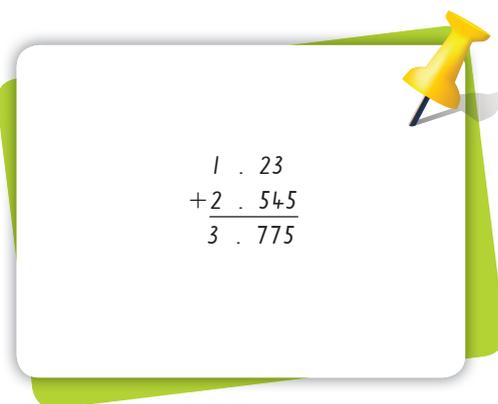
3.775 m

- b What was the length of timber left over from the first piece?

0.225 m left over

- c What was the length of timber left over from the second piece?

0.935 m left over



Multiplying decimals by whole numbers

1 Calculate the following, giving an estimate first.

a 8.7×4

Estimate: 36

Answer: 34.8

b 12.73×8

Estimate: 100

Answer: 101.84

c 1.703×12

Estimate: 20

Answer: 20.436

2 A washing line is to be replaced. Each section of line is 4.3 m long. What length of line is required to replace:

a 6 sections? 25.8 m

b 15 sections? 64.5 m



3 A bag of seed corn is enough to plant a field with an area of 2.6 ha. What area can be planted with:

a 10 bags? 26 ha

b 25 bags? 65 ha

4 A garden fence costs \$54.95 for each metre. What is the cost of fencing the following perimeters:

a 18 metres? \$989.10

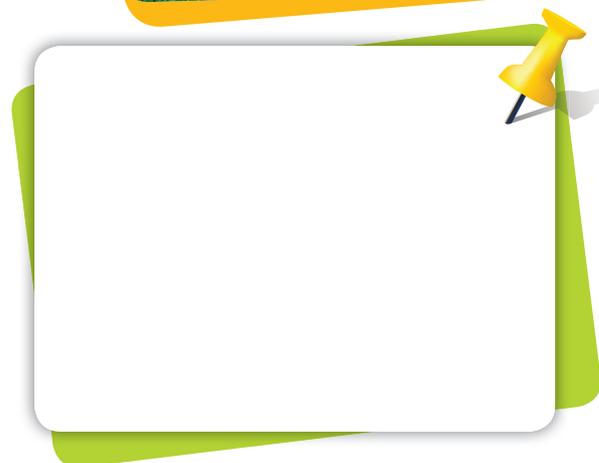
b 54 metres? \$2967.30



5 Each can of soft drink has a volume of 0.375 L. What is the total volume of a pack containing:

a 24 cans? 9L

b 36 cans? 13.5L



MiB 3
Cards 15
and 16

Dividing decimals by whole numbers

1 Give an estimate for each of the following:

a $5 \overline{)129.56}$

Estimate: 26

b $23.498 \div 3$

Estimate: 8

c $\frac{0.542}{7}$

Estimate: 0.08

2 Explain how you gave your estimate answer for Question 1c.

I divided 54 by 7, then moved the decimal point two places to the left.

3 A farmer has an annual wheat harvest of 633.68 t that he stores in 4 silos before shipping it to the mill.



a What mass of wheat is in each silo?

158.42 t

b It takes a truck 8 trips to the mill to empty each silo. How much does the truck carry in each load?

Round your answer to one decimal place.



19.8 t

4 A piece of timber that is 3.942 m in length needs to be cut into 6 equal pieces. How long will each piece be?

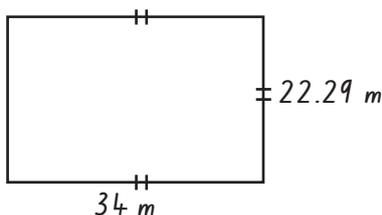
0.657 m

5 A piece of land with an area of 9094.4 square metres is divided into 12 equal blocks of land. What is the area of each block of land?

757.867 m²



Draw a rectangle that represents one of the blocks. Label your block with a length and width that give the correct total area. Compare your rectangle with a classmate's. Which block would you build a house on?



Percentages

1 Write each fraction as a percentage.

a $\frac{9}{100} = \underline{9} \%$
c $\frac{26}{100} = \underline{26} \%$
e $\frac{47}{100} = \underline{47} \%$
g $\frac{87}{100} = \underline{87} \%$

Remember!

Percentage means 'out of 100'. So, 78% is $\frac{78}{100}$ or 0.78.

b $\frac{18}{100} = \underline{18} \%$
d $\frac{38}{100} = \underline{38} \%$
f $\frac{52}{100} = \underline{52} \%$
h $\frac{98}{100} = \underline{98} \%$

2 Find the equivalent fractions and their percentages.

a $\frac{3}{4}$ of 100 = $\frac{75}{100} = \underline{75} \%$ **b** $\frac{2}{5}$ of 100 = $\frac{40}{100} = \underline{40} \%$
c $\frac{3}{5}$ of 100 = $\frac{60}{100} = \underline{60} \%$ **d** $\frac{3}{10}$ of 100 = $\frac{30}{100} = \underline{30} \%$
e $\frac{8}{10}$ of 100 = $\frac{80}{100} = \underline{80} \%$ **f** $\frac{7}{10}$ of 100 = $\frac{70}{100} = \underline{70} \%$

3 Complete these tables.

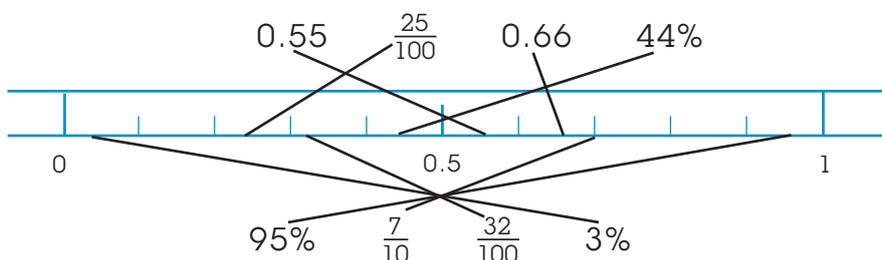
Fraction	Decimal	Percentage
$\frac{1}{2}$	0.5	50%
$\frac{1}{4}$	0.25	25%
$\frac{1}{10}$	0.1	10%

Fraction	Decimal	Percentage
$\frac{1}{5}$	0.2	20%
$\frac{4}{5}$	0.8	80%
$\frac{7}{20}$	0.35	35%

4 Colour the square in each group that contains the smallest value.

$\frac{2}{10}$	0.15	10%	$\frac{28}{100}$	0.25	30%
$\frac{45}{100}$	0.55	50%	$\frac{15}{100}$	0.1	20%
$\frac{38}{100}$	0.42	40%	$\frac{68}{100}$	0.65	60%

5 Place the following percentages, decimals and fractions on the number line by drawing a line to their correct position.



Sporting percentages

- 1 Fabio and Manuel have played a game of tennis. Use the statistics from their game, shown in the table below, to answer the questions.

	Fabio	Manuel
Aces	10%	20%
First serves in	50%	50%
Double faults	20%	25%
No. of serves	280	240



- a How many aces did each player make?

Fabio = 28 aces, Manuel = 48 aces

- b How many double faults did each player make?

Fabio = 56 double faults, Manuel = 60 double faults

- c Who had the greater number of first serves in?

Fabio

- d Which player do you think won the game? Give a reason for your answer.

Manuel, as his ace/double fault ratio is better,

4:5 compared to 1:2

- 2 Renee, the goalie for the Rushtown Rats, has a 'save percentage' of 75% and Greta, the goalie for the Baycity Blues, has a 'save percentage' of 90%.



- a What is a 'save percentage'?

The percentage of shots saved from total shots at goal.

- b Renee has played 48 games. How many balls has she let through to the goal? How many 'saves' has she made?

12 balls, 36 saves

- c Greta has played 120 games. How many balls has she let through to the goal? How many 'saves' has she made?

12 balls, 108 saves



A ratio is a comparison. It is related to a fraction but does not show the same information.

Consider the picture below:

A **ratio** compares one part to another part,

yellow to red

2 : 6

OR

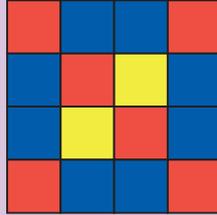
red to blue

6 : 8

OR

blue to red to yellow

8 : 6 : 2



A **fraction** compares one part to the total number of parts.

The fraction of red is $\frac{6}{16}$

The fraction of blue is $\frac{8}{16}$

The fraction of yellow is $\frac{2}{16}$



Use the picture on the right to answer these questions.

1 What is the ratio of:

a blue to red? 9:4

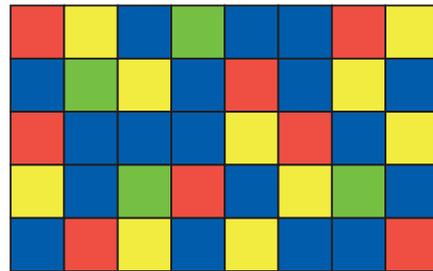
b red to blue? 4:9

c yellow to green? 5:2

d green to red? 2:5

e blue to green to red? 9:2:4

f red to green to yellow to red? 4:2:5:4



2 a What is the ratio of:

i blue to yellow? 9:5 **ii** yellow to blue? 5:9

b Are these ratios the same? Explain.

No. They are the inverse of each other. They do indicate the same information though.

c Does it matter which way around you write a ratio and its numbers? Why?

Yes, as the order tells you what is being compared to what.

3 How many other ratios can you write from this picture? Which ones have not been written on this page?

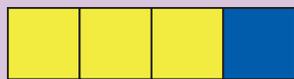
Blue and red to yellow and green = 13:7

Blue and yellow to red and green = 7:3

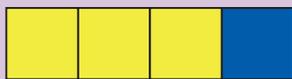
Blue and green to red and yellow = 11:9

Lowest form of a ratio

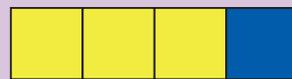
A ratio is similar to a fraction; it can be simplified into its 'lowest form' in the same way that a fraction can be.



yellow : blue
3 : 1



yellow : blue
~~6~~ : ~~2~~
3 : 1



yellow : blue
~~9~~ : ~~3~~
3 : 1

1 Reduce these ratios to their lowest form.

a 6 : 3 2:1

b 8 : 2 4:1

c 5 : 10 1:2

d 6 : 18 1:3

e 25 : 5 5:1

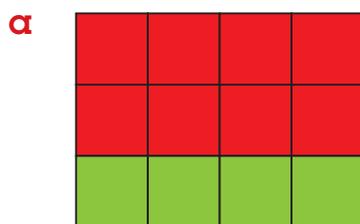
f 30 : 10 3:1

g 25 : 45 5:9

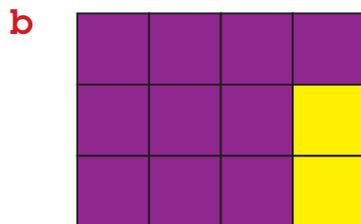
h 16 : 64 1:4

i 150 : 250 3:5

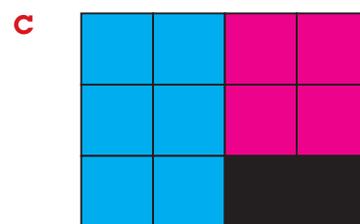
2 Colour these shapes in the ratio given.



red : green
2 : 1



purple : yellow
5 : 1



blue : pink : black
3 : 2 : 1

Compare your pictures with a friend's. Do you have the same pattern? Do you have the same ratio? On a piece of paper draw two more patterns for each ratio.

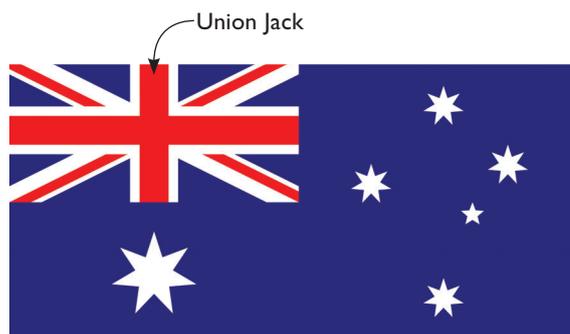
3 Use a ruler to measure the picture of the Australian flag. What is the lowest form of the ratio of:

a its length : its width

$l = 75\text{mm}, w = 35\text{mm}, \text{ratio} = 7:15$

b the length of the Union Jack :
the length of the whole flag

1:2



Using ratios

1 On the right is the ingredient list for Chocolate Caramels.

- a** What is the ratio of dark chocolate to white chocolate? 3:1
- b** If you have 250 g of white chocolate, what mass of dark chocolate would be needed? 750 g
- c** Margaret used 135 g of dark chocolate. What mass of white chocolate did she use? 45 g
- d** You need to make 50 Chocolate

Caramels to give as gifts. How much of each ingredient do you need?

750 g dark chocolate, 400 g Mars Bar, $\frac{5}{4}$ cup cream, 250 g white chocolate.



2



A cereal box offer asks you to collect 20 tokens to win a prize. Each cereal box has 2 tokens.

- a** How many boxes do you need to buy to win a prize? 10
- b** In order to get a prize for each of her 3 children, how many boxes of cereal must Lisa buy? 30
- c** If the company makes 10 000 cereal boxes, how many prizes should it be prepared to give away?
1000

3

A dozen cream buns cost \$7.80.

- a** How much does 1 cream bun cost? 65¢
- b** How much do 7 dozen cream buns cost?
\$4.55



Money matters

1 You win a raffle where you choose your prizes to a value of exactly \$80 000. The list of prizes is shown in the table on the right.



Prize	Value
Cash	Up to \$25 000
HSV Clubsport	\$78 990
Falcon GTP	\$36 490
Toyota Hilux	\$19 990
VW convertible	\$42 990
Quintrex 435 (boat)	\$4 500
Harley Davidson	\$55 000
Vespa scooter	\$ 3 490
Holiday	\$12 000



a Which prizes would you choose? Explain why.

I would choose a Harley Davidson and \$25 000 in cash, because it would give me the maximum amount of cash.

b If the second prize was \$500 of instant lottery tickets, where you could win up to \$250 000, which prize, first or second, would you prefer to win? Give a reason for your choice.

First prize. The certainty of goods to the value of \$80 000 is better than a very small chance of \$250 000.

2



A supermarket records the gross profits on the right over a five-year period.

Year	Profit (\$m)
2006	\$6618
2007	\$6958
2008	\$7802
2009	\$9444
2010	\$10 754

a What is the total gross profit made by this company over the five-year period? Write a mathematical statement to show how you calculated the answer.

$$6618 + 6958 + 7802 + 9444 + 10754 = \$41576 \text{ m}$$

b Round the total gross profit to the nearest hundred million and rewrite this number using an abbreviation for billions of dollars.

$$\$41.66 (\$b)$$

c Complete the table showing the increase in profit made each year and the mathematical statement used to calculate it. The first one has been done for you.

2006–2007	2007–2008	2008–2009	2009–2010
\$6958 m – \$6618 m	\$7802m – \$6958m	\$9444m – \$7802m	\$10754m – \$9444m
\$340 m	\$844m	\$1642m	\$1310m

d If this company continues to increase its profit at the same rate, estimate its expected gross profit in 2011. \$332m

Shopping for jewellery

1 Indicate whether you would solve each question using a mental (M) strategy, a written (W) strategy or a calculator (C).

a	$296 - 96$	<u> </u> (M)	b	$863 - 45$	<u> </u> (M)
c	$9933 - 718$	<u> </u> (W)	d	$3214 - 141$	<u> </u> (M)
e	$3323 - 33$	<u> </u> (M)	f	$6350 - 71$	<u> </u> (M)
g	$96\ 550 - 9934$	<u> </u> (C)	h	$29\ 595 - 7245$	<u> </u> (W)
i	$82\ 660 - 929$	<u> </u> (W)	j	$82\ 974 - 603$	<u> </u> (M)
k	$15\ 897 - 80$	<u> </u> (M)	l	$40\ 107 - 37$	<u> </u> (M)

2



You are given \$50 000 to spend on jewellery. The prices of the available pieces are shown below. Which pieces of jewellery would you purchase? What is their total cost and how much change will you receive?



woman's watch
\$14 900



man's watch
\$10 250



pocket watch
\$20 450



man's watch
\$15 300



gold bracelets
\$7800 each



bracelet
\$32 600



man's bracelet
\$12 700



gold chains
\$5000 each



silver chain
\$7850



pearls
\$22 600



necklace and earring set
\$12 500



diamond set
\$27 900



diamond set
\$32 100



cufflinks
\$2850



gold cufflinks
\$6100

I would buy the diamond set, the cufflinks and the woman's watch.

Total cost = \$49 850. Change = \$150. (Sample answer only.)

At the sales

Maya has been saving her money to spend at the big sales after Christmas each year. She finds the following items reduced by the percentages indicated.

- 1 Find the discount that Maya will receive on each item. If needed, round your answers to the nearest cent.



Coffee machine
\$649.00
10% discount

Discount = \$64.90



Plasma TV
\$949.00
20% discount

Discount = \$189.80



mp3 player
\$189.00
25% discount

Discount = \$47.25



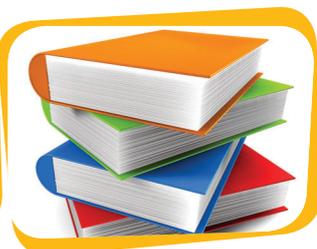
Mobile phone
\$149.00
50% discount

Discount = \$74.50



Digital camera
\$139.00
10% discount

Discount = \$13.90



Books
\$29.95 each
20% discount

Discount = \$5.99



Music CDs
\$34.95 each
25% discount

Discount = \$8.74



Movie DVDs
\$39.95
50% discount

Discount = \$19.98

- 2 Which of these items do you think is the 'best buy' of the day? Give reasons for your answer.

The Plasma TV, as the most money is saved.

Money and rates

1 A mobile phone plan charges 14c per SMS, 40c per minute on local calls and 66c per MMS. How much do each of the following people pay for their phone usage?

- a** Joshua: 500 SMS, 100 MMS and 15 minutes of local calls \$142
- b** Kamal: 750 SMS and 250 MMS \$270
- c** Erica: 100 SMS, 10 MMS and 35 minutes of local calls \$64.60



Do you have a mobile phone? What are you charged for your SMS, MMS and local calls?

2 Emma does some part-time babysitting. She charges \$12.80 per hour before midnight and \$22.40 per hour after midnight. What does she earn for each of the following babysitting jobs?

- a** 6:00 p.m. to 11:00 p.m. $12.80 \times 5 = \$64$
- b** 7:00 p.m. to 2:00 a.m. $(12.80 \times 5) + (2 \times 22.40) = 64 + 44.80 = \128.80
- c** 6:30 p.m. to 12:30 a.m. $(12.80 \times 5.5) + (22.40 \times 0.5) = 70.40 + 11.20 = \81.60

3



Oranges can be bought at the supermarket for \$2.48/kg. What is the cost of these bags of oranges?

- a** 5 kg bag \$12.40
- b** 3.5 kg bag \$8.68
- c** 1.75 kg bag \$4.34
- d** Another store charges \$8.80 for a 4 kg bag of oranges. Which shop sells the cheaper oranges? Give a reason for your answer.

The second shop is cheaper.

The first shop charges \$9.92 for 4 kg.