We are learning to calculate percentages of whole number amounts using benchmark percentages.
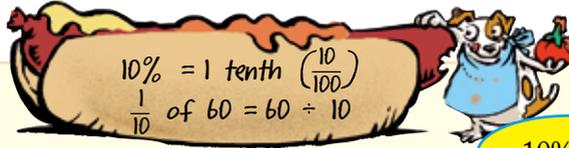
You can use some percentages that are easy to work with to calculate other percentages. 10%, 25% and 50% are easy percentages to find.

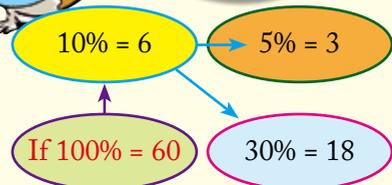We call these sorts of percentages benchmarks.

Example About 35% of the 60 people at a riding school were left-handed. How many were left-handed?

You could use a mind map to help

$$10\% = 1 \text{ tenth } \left(\frac{10}{100}\right)$$
$$\frac{1}{10} \text{ of } 60 = 60 \div 10$$

10% of 60 = 6

5% of 60 = half of 10% of 60 = half of 6 = 3
30% of 60 = 3 times 10% of 60 = 3 × 6 = 18.
35% of 60 = (30% + 5%) of 60 = 18 + 3 = **21**

10% = 6   5% = 3

If 100% = 60   30% = 18

or

You could use a double number line. It is easy to see from this that 35% of 60 = (30% + 5%) of 60 = 3 + 18 = 21

0	3	6		18		30		60 **number**
0	5%	10%		30%		50%		100% **percentage**

or

All of these strategies use benchmarks like finding 10% first to help work out the answer.

100% = 60   so   10% = 6   so   5% = 3   so   30% = 18
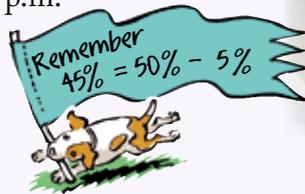
35% = 30% + 5%
= 18 + 3
= 21

Convert fractions to decimals, and percentages and vice versa.
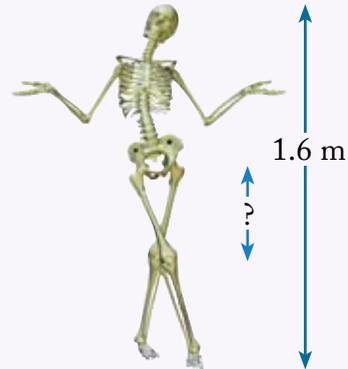**Estimating Percentages Book 8**

1 Discuss how benchmarks could be used to solve these and find the answers.

There were 80 people at a restaurant one evening.

a 15% ordered the chicken dish.
How many ordered the chicken dish.

b 95% of them had left by 10 p.m.
How many had left?

Remember
45% = 50% − 5%

c 45% of them were female.
How many were female?

2 Find the answers to these using an efficient strategy.

a There are 180 pupils at Jamie's school.
30% of them went on camp.
How many went on camp?

b Sudi sells computers. She gets 5% of the value of each one she sells.
What does she get if she sells a computer for $840?

c David's family went out for dinner.
The cost of the meal was $140.
They gave a 15% tip.
How much did they tip?

d The femur (thighbone) is a long bone.
Its length is about 25% of a person's height.
Ann is 1·6 m tall.
About how long is her femur?

1.6 m

?

3 Find these.

a 70% of 60 kg **b** 40% of 360 ml **c** 15% of 240 m **d** 11% of 3200 km
e 5% of 164 cm **f** 65% of 1200 g **g** 95% of $4580 **h** 45% of 26·4 m

4 Challenge

I'm going to do the calculations for a ring that originally cost $100.

A jeweller took 10% off all gold rings one week.
At the end of the week she added 10% of the sale price back again.

These new prices were not the same as the old prices.
Explain to a partner why not.

We are using fractions equivalent to percentages to estimate percentages of given numbers.

Activity 2

1 Copy this table and fill in the missing fractions and percentages.

Percentage	10%	50%	20%		
Fraction				$\frac{1}{4}$	$\frac{1}{8}$

2 Last year there were 750 whales stranded around the world.

I read that there were 4·8% more whales stranded this year than last. How can I estimate about how many more there were this year?

Well 4·8% is close to 5% and 5% is half of 10%.

Discuss with a classmate how Millee could make an estimate using Sam's suggestion.
What would Millee's estimate be?
Millee worked out the answer using a calculator and got 36.
Is the estimate acceptable?

Check using an estimate whether the red numbers given in questions 3 to 9 are reasonable. Justify your answer.

3 Katrina's bank account earns interest of 8·9% per year.
Katrina thought that she would earn **$28·93** interest this year on the $325 she has in her savings account.

4 Last year 1260 lambs were born on Blair's farm.
This year 31·6% more lambs were born.
Blair worked out that there were **488** more lambs born this year.

5   Sam's baby sister weighed 8·2 kg when she was eight months old.
    When she was weighed three months later her weight had increased by 15·6%.
    Her weight had increased by **1·3** kg

6   It was found in the 2006 census that 74·2% of New Zealand households
    have access to a cell phone.
    In a town of 860 households, **638** of them would have access to a cell phone.

7   The Fire Service reported that during a bush fire
    44·3% of land in a national park was burnt.
    The national park covered 3563 hectares so
    1797·75 hectares of the park was burnt.

8   Mumbai in India has **2609·54** mm of rain in the monsoon season.
    This is 96·4% of the annual rainfall of 2707 mm.

9   Every week Akram donates 0·89% of his wages to charity.
    a   He earned $468 one week and donated **$4·17.**
    b   He got a pay rise to $536·50 a week. Now he will donate **$5·39.**

10 **Challenge**   Estimate which is greater,

    a 59% of $48·90 or 80·6% of $45·70.
    b 19·6% of $5889 or 5·8% of $16 788.

    Show how you estimated these.

Designer homes

Design a floor plan for a house that has about
      40% for the bedrooms,
      40% for the lounge, dining room and any other living rooms,
      20% for the kitchen, bathrooms and hallways.

This information might help you.
   • A typical house will have between 100 m² in total
     (small house) up to 300 m² (large house).
   • You could take some measurements from you own home to see what typical
     room sizes are.
   • You could use the squares in your maths book to help you draw the plan.

At the fair

Sam and Millee went to a local fair.

1 There was a very large market at the fair.
Millee had a coupon for one of the stalls that gave her 10% discount on items up to $50 and 15% discount for items over $50.
She bought a garden statue and three packets of seeds for her mother for Mother's Day.

$64·00

$3·80

$3·80

$3·80

a How much did Millee save on the garden statue?

b How much did she pay for it?

c How much did she save on the packets of seeds?

d How much did she spend altogether?

Estimate first.
Round sensibly.

2 There was a rides section at the fair and there were some special discounts offered on the rides.

HELISPINNER RIDE

$10·60

25% DISCOUNT TODAY ONLY

Ride in the Dark

ADULTS $10
CHILDREN $8
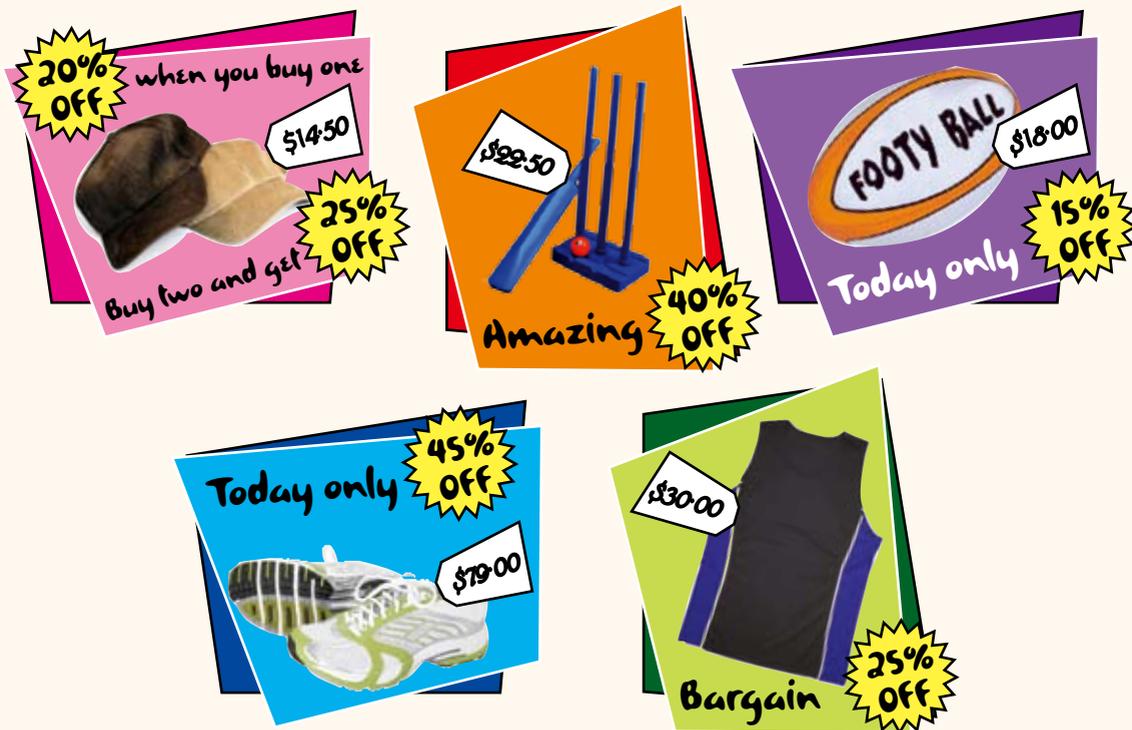FAMILY OF UP TO 5 $28

TODAY ONLY 35% DISCOUNT

SEE THE WORLD BIG WHEEL

$8 per person or save 20% by filling a capsule – $40

(a capsule holds up to 6 people)

a How much do you save on the Helispinner ride today?

b How much is each ride on the Helispinner?

c How much does each adult, child and family save on the "Ride in the Dark" ride today?

d How much does each sort of ticket for "Ride in the Dark" cost today?

Convert fractions to decimals, and percentages and vice versa.
Estimating Percentages Book 8

e Would it be cheaper for two adults and one child to buy a family ticket or individual tickets for "Ride in the Dark" today?

f Is the advertisement for the See the World Big Wheel correct in saying that you save 20% if you pay $40 for a whole capsule and fill it with 6 people? Justify your answer.

3 A stall selling sports gear and sports wear had the following items on sale.

20% OFF when you buy one
$14·50
25% OFF Buy two and get

$22·50
Amazing 40% OFF

FOOTY BALL
$18·00
15% OFF Today only

45% OFF Today only
$79·00

$30·00
Bargain 25% OFF

a Sam bought a sports singlet and a rugby ball. How much did he save?

b How much change did he get from $50?

c Make a table showing the items, their original price, the saving made and the sale price.

d Millee spent almost $50 at this stall. What might she have bought? Give three different possibilities.

e Millee's mum spent between $25 and $40. Give an example of what she might have bought.

f What is the total saving that you would make if you bought one of each item on sale?