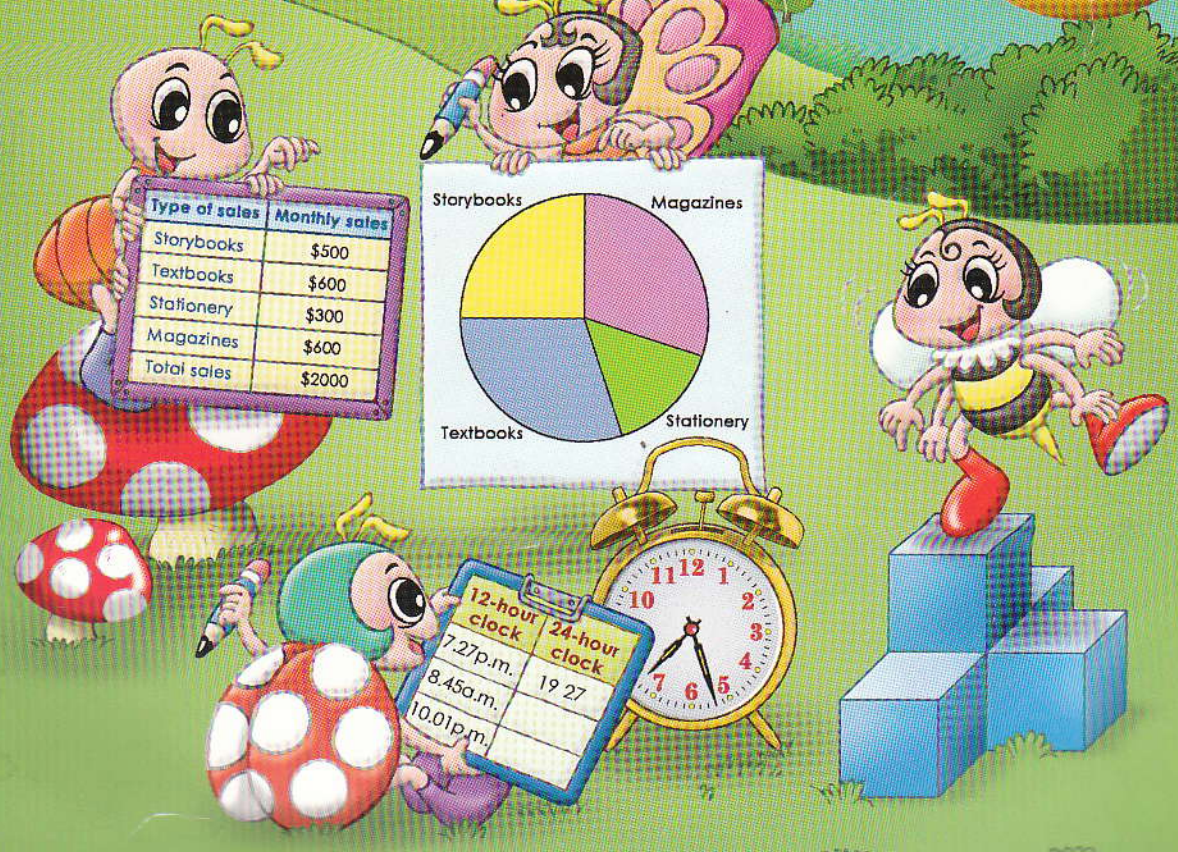
In Step MATHS

TEXTBOOK 6A
EM1/2



Dr Lai Chee Chong • Leong Weng Kee
General Editor: Sin Kwai Meng

SNP Panpac

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Preface

IN STEP MATHS is a series of textbooks and accompanying workbooks specially written to meet the mathematical needs of primary school pupils.

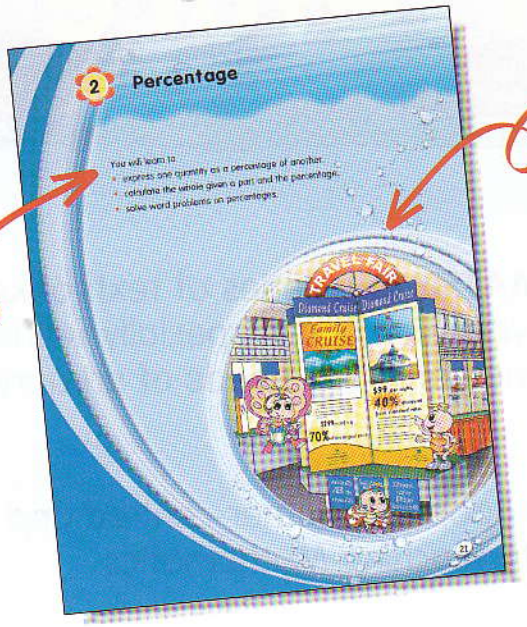
This series adopts a learner-centred and lively approach to teaching Mathematics.

Each chapter in the textbook begins with a chapter separator and warm-up activity which create opportunities for class discussion and interaction. Numerous illustrations in each chapter also enhance pupils' understanding of the mathematical concepts. Stimulating questions and fun activities challenge pupils to think critically and creatively. Learning outcomes are summarised at the end of the chapter to provide a quick review.

Through IN STEP MATHS, pupils can become proficient in Mathematics while learning to appreciate the beauty and power of the subject.

About The Book

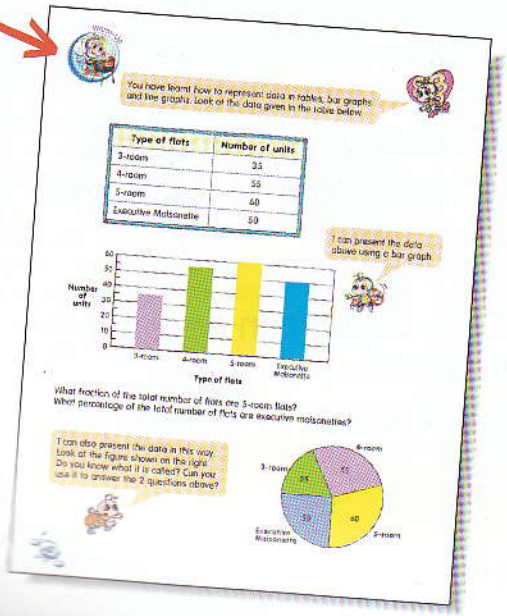
Each chapter in the **IN STEP MATHS** textbook has the following features:



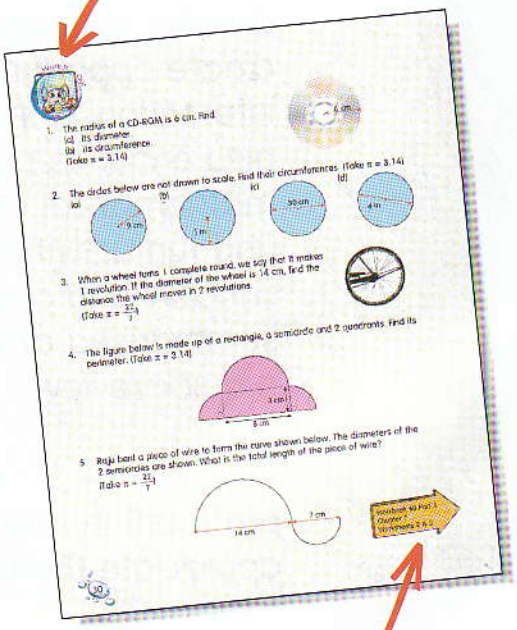
Chapter Separator
Shows an interesting picture related to the chapter.

You will learn to
Highlights the learning outcomes of the chapter.

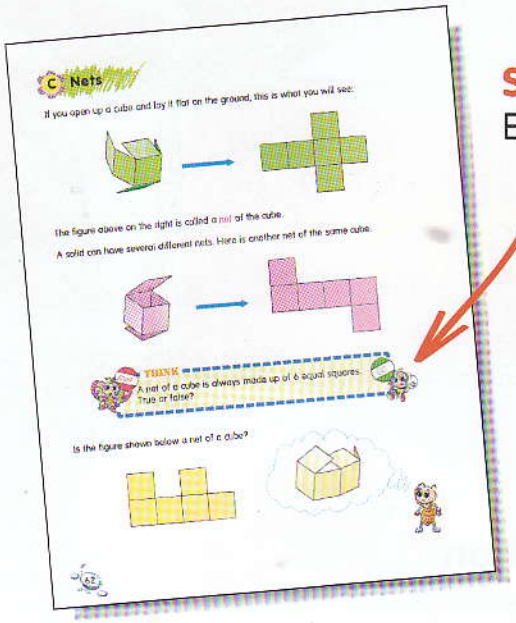
Warm-Up
Reviews concepts taught and introduces new concepts in a creative manner.



Work It Out
Acts as a quick review.



Directs pupils to the appropriate worksheet.

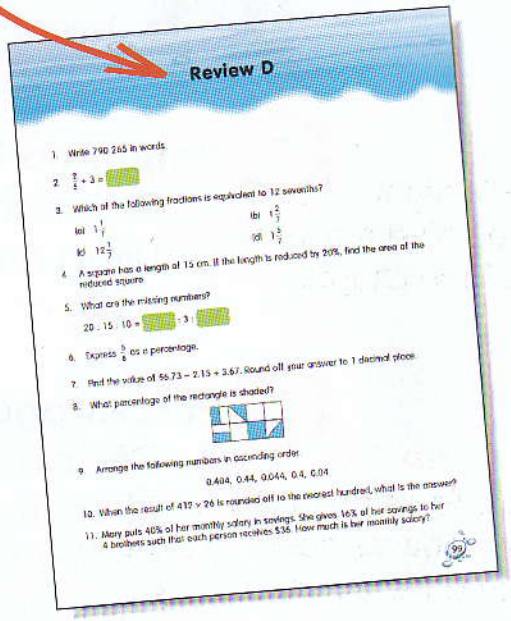


Stop-Think-Go

Encourages pupils to think further.

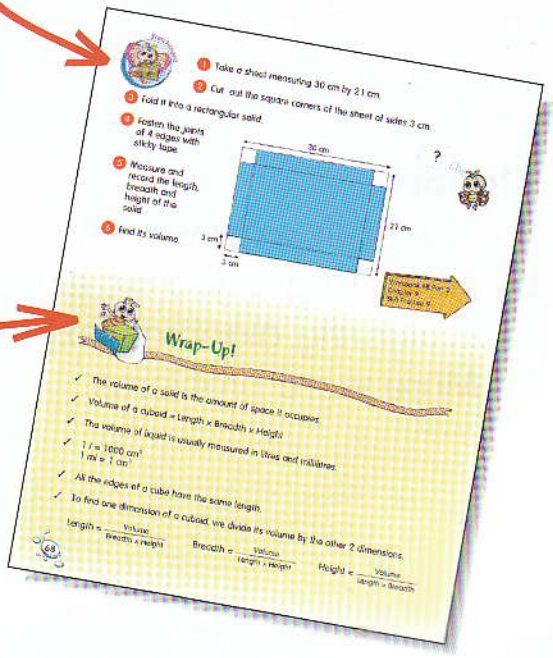
Review

Reinforces concepts taught in the earlier chapters.



Enrichment

Engages pupils with activities that are fun-filled and promote critical and creative thinking skills.



Wrap-Up!

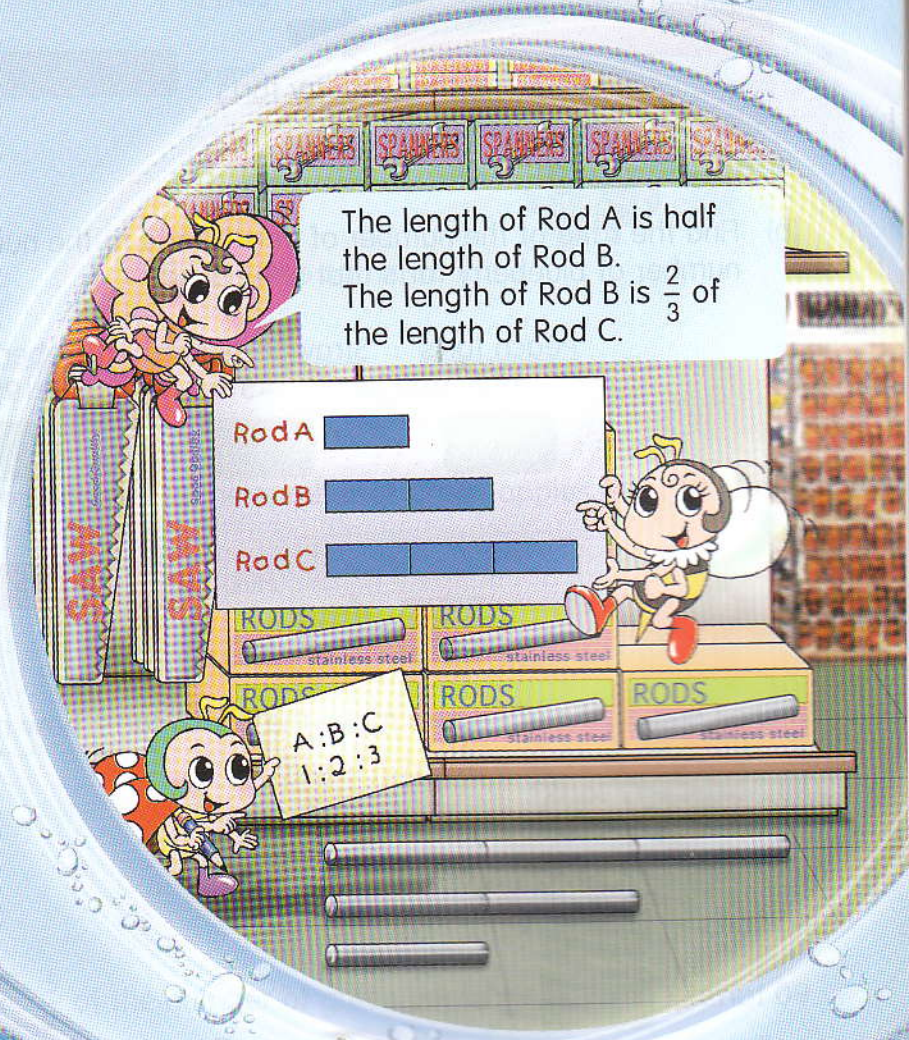
Summarises the main points learnt in the chapter.

Contents

1 Ratio And Direct Proportion

You will learn to

- express one value as a fraction of another given their ratio, and vice versa.
- find how many times one value is as large as another given their ratio, and vice versa.
- recognise two quantities in direct proportion.
- solve direct proportion word problems using unitary method.
- solve word problems involving ratio and proportion.



We can use ratios to compare things in the same units.

Seema baked 180 peach tarts, 45 strawberry tarts and 90 blueberry tarts.

Peach tart

Strawberry tart

Blueberry tart

(a) Find the ratio of the number of peach tarts to the number of blueberry tarts that she baked.

Peach tarts	:	Blueberry tarts
180	:	90
= 2	:	1

(b) Find the ratio of the number of peach tarts to the number of strawberry tarts to the number of blueberry tarts that she baked.

Peach tarts	:	Strawberry tarts	:	Blueberry tarts
180	:	45	:	90
=	:		:	

Can you simplify this ratio?

If she used 1.2 kg of flour to make the peach tarts, how much flour did she use to make the
(i) strawberry tarts and
(ii) blueberry tarts?

180 tarts → 1.2 kg of flour

45 tarts → kg of flour

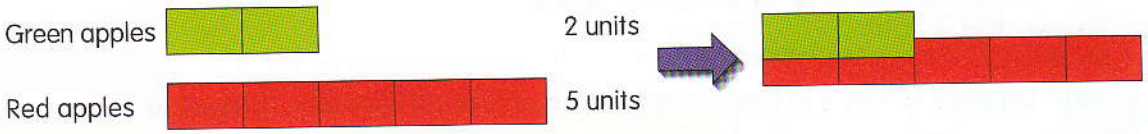
90 tarts → kg of flour

A Ratios and fractions

1. Lily has 2 green apples and 5 red apples.

Green apples : Red apples
2 : 5

(a) The ratio of the number of green apples to the number of red apples is 2 : 5.



2 : 5 is the same as $\frac{2}{5}$.

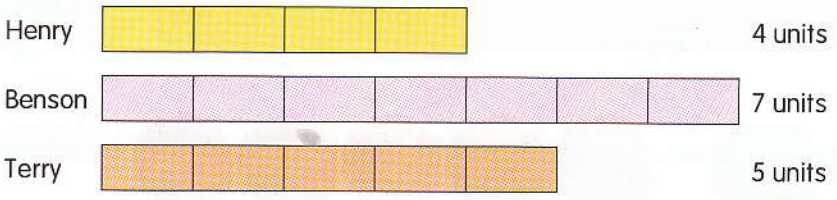
The number of green apples is $\frac{2}{5}$ of the number of red apples.

(b) The ratio of the number of red apples to the number of green apples is 5 : 2.

5 : 2 is the same as $\frac{5}{2}$.

The number of red apples is $\frac{5}{2}$ of the number of green apples.

2. A sum of money is shared among Henry, Benson and Terry in the ratio 4 : 7 : 5.



(a) Express Terry's share as a fraction of Benson's share.

Terry's share : Benson's share
5 : 7

Terry's share is $\frac{5}{7}$ of Benson's share.

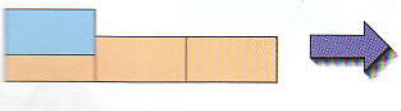
(b) Express Henry's share as a fraction of the whole sum of money.

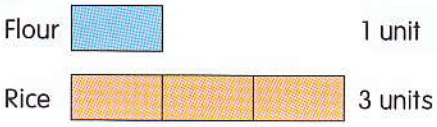
Henry's share : Whole sum of money
4 : 16
= 1 : 4

4 + 7 + 5 = 16 units

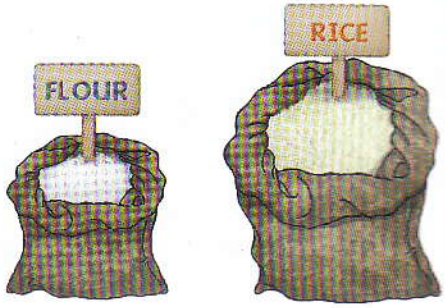
Henry's share is $\frac{\square}{\square}$ of the whole sum of money.

3. The mass of a bag of flour is $\frac{1}{3}$ of the mass of a bag of rice. What is the ratio of the mass of the bag of flour to the mass of the bag of rice?

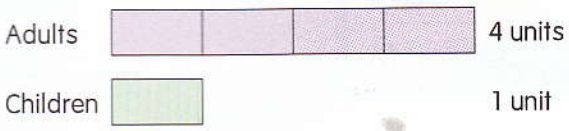




The ratio is $\square$: $\square$.



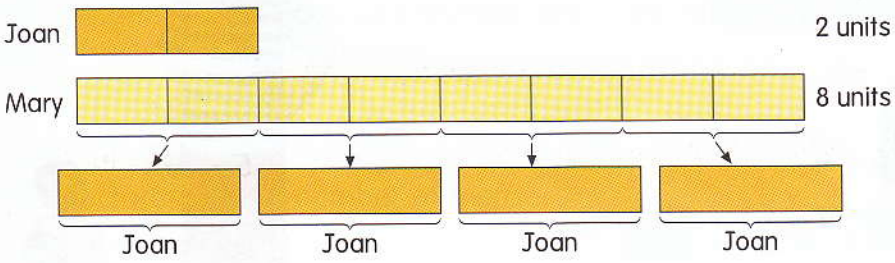
4. There are 4 times as many adults as children at a concert. What is the ratio of the number of adults to the total number of people at the concert?



Adults → 4 units
Children → 1 unit
Total number of people → 5 units

The ratio is ____ : ____.

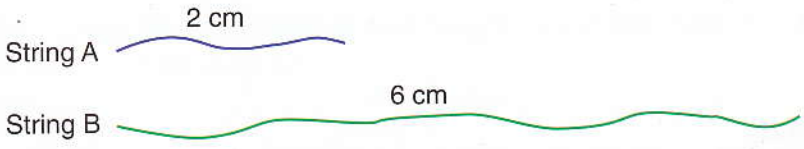
5. The ratio of the number of Joan's stickers to the number of Mary's stickers is 2 : 8. How many times as many stickers as Joan does Mary have?



$8 \div 2 = 4$

Mary has ____ times as many stickers as Joan.

6. The lengths of 2 strings, String A and String B, are shown below.

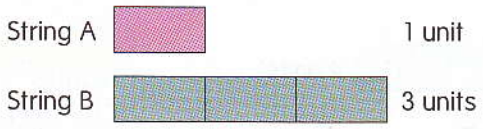


(a) What is the ratio of the length of String A to that of String B?

String A : String B
2 : 6
= 1 : 3

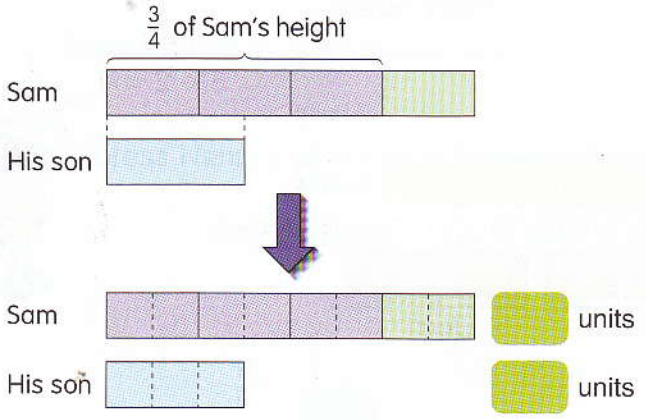
The ratio is 1 : 3.

(b) How many times is String B as long as String A?



String B is ____ times as long as String A.

7. $\frac{3}{4}$ of Sam's height is twice as much as his son's height. What fraction of Sam's height is his son's height?



His son's height is ____/____ of Sam's height.

THINK

We can add 2 fractions to obtain a new fraction.

Example: $\frac{1}{2}+\frac{1}{3}=\frac{3}{6}+\frac{2}{6}=\frac{5}{6}$

Can we add 2 ratios to obtain a new ratio?

1. The table shows the masses of 3 objects.

Object	A	B	C
Mass (kg)	8	16	12

Express the following ratios in their simplest forms.
(a) Mass of Object A : Mass of Object B
(b) Mass of Object B : Total mass of the 3 objects
(c) Mass of Object A : Mass of Object B : Mass of Object C

2. Sally sells balloons of 2 different colours. The ratio of the number of red balloons to the number of blue balloons that she has is 4 : 7.
(a) Express the number of red balloons as a fraction of the number of blue balloons.
(b) Express the number of blue balloons as a fraction of the total number of balloons.

3. The lengths of the sides of a triangle are in the ratio 4 : 5 : 3. Express the shortest side as a fraction of the perimeter.

4. $\frac{5}{6}$ of the spectators watching a soccer match were men. Find the ratio of the number of spectators to the number of men.

5. The number of boys is $\frac{3}{5}$ of the number of pupils in a class. Find the ratio of the number of boys to the number of girls.

6. For a charity project, the funds raised by School A was $\frac{3}{2}$ of that raised by School B. What was the ratio of the amount of funds raised by School A to the amount raised by School B?

7. The masses of 2 bags of sugar, Bag X and Bag Y, are in the ratio 6 : 24. How many times is Bag Y as heavy as Bag X?

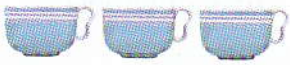
8. $\frac{1}{2}$ of the amount of water in Container A is 3 times as much as the amount of water in Container B. What is the ratio of the amount of water in Container A to the amount of water in Container B?

Workbook 6A Part 1
Chapter 1
Worksheets 1 to 3

B Direct proportion

Quantities in direct proportion

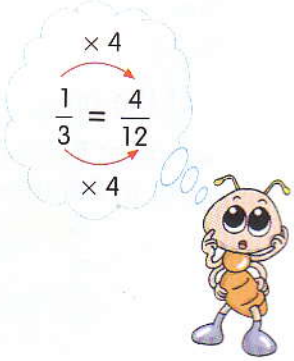
1. Mrs Lee adds 3 cups of water to every cup of lemon juice to make some lemonade for a party. How many cups of water will she need if she uses 4 cups of lemon juice?

Lemon juice	Water
 1 cup	 3 cups
 $1 \times 2 = 2$ cups	 $3 \times 2 = 6$ cups
 $1 \times 3 = 3$ cups	 $3 \times 3 = 9$ cups

The ratio of the number of cups of lemon juice to the number of cups of water is 1 : 3.
1 : 3 = 2 : 6 = 3 : 9

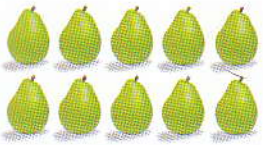
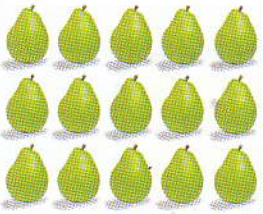
When the number of cups of lemon juice increases, the number of cups of water also increases by the same factor. We say that the number of cups of lemon juice is in direct proportion to the number of cups of water.

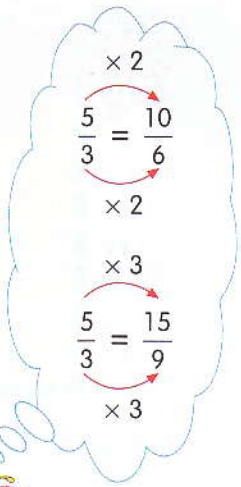
Lemon juice (cups)	1	2	3	4
Water (cups)	3	6	9	12



Mrs Lee will need 12 cups of water for 4 cups of lemon juice.

2. A fruit stall owner sells 5 pears for \$3.

Number of pears	Cost
 5 pears	\$3
 $5 \times 2 = 10$ pears	$\$3 \times 2 = \$6$
 $5 \times 3 = 15$ pears	$\$3 \times 3 = \$9$



Number of pears	5	10	15
Cost (\$)	3	6	9

When the number of pears increases, the cost also increases by the same factor. The number of pears and the cost are in direct proportion.

(a) Mary wants to buy 40 pears. How much does she need?

$$\frac{5}{3} \overset{\times 8}{=} \frac{40}{\square} \quad (\times 8)$$

Mary needs \$ ☐ to buy 40 pears.

(b) Susan has $12. How many pears can she buy?

$$\frac{5}{3} \overset{\times 4}{=} \frac{\square}{12} \quad (\times 4)$$

Susan can buy ☐ pears.

THINK

Which statement below shows 2 quantities in direct proportion?

Statement A: 2 loaves of bread cost $3.
5 loaves of bread cost $6.

Statement B: 3 pens cost $1.20.
12 pens cost $4.80.

3. A carpenter can make 6 chairs every 4 days. How many chairs can he make in 10 days?

Days	Chairs
4	6
$4 \times 2 = 8$	$6 \times 2 = 12$
$4 \div 2 = 2$ } 10 days	$6 \div 2 = 3$ } 15 chairs

He can make 15 chairs in 10 days.

Using the unitary method

We can also use the unitary method to help us solve direct proportion problems.

Let us look at the previous question again.

1. A carpenter can make 6 chairs every 4 days. How many chairs can he make in 10 days?

Find how many chairs he can make in 1 day. Then multiply that by 10 days.

4 days $\rightarrow$ 6 chairs

1 day $\rightarrow \frac{6}{4}$ chairs

10 days $\rightarrow \frac{6}{4} \times 10$ chairs

$= 15$ chairs

He can make 15 chairs in 10 days.

2. A car can travel 400 km on 25 l of petrol. How far can it travel on 15 l of petrol?

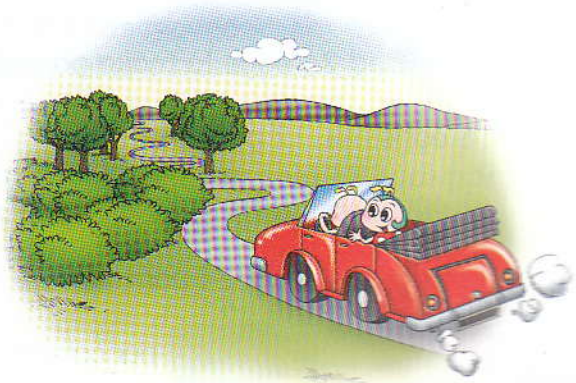
Find how far the car can travel on 1 l of petrol. Then multiply that by 15 l.

25 l $\rightarrow$ 400 km

1 l $\rightarrow \frac{400}{25}$ km

15 l $\rightarrow \frac{400}{25} \times 15$ km

$=$ [ ] km



It can travel [ ] km on 15 l of petrol.

3. Amy uses 900 g of chicken to make chicken curry for 6 people.
   (a) How much chicken will Amy need to make the curry for 8 people? Give your answer in kilograms.

   6 people → 900 g

   1 person → ____ g

   8 people → ____ g = ____ kg

   Amy will need ____ kg of chicken to make the curry for 8 people.

   (b) How many people can have the curry if she uses 2.7 kg of chicken?

   2.7 kg = 2700 g

   900 g → 6 people

   1 g → ____ people

   2700 g → ____ people

   ____ people can have the curry if she uses 2.7 kg of chicken.

4. Jenny had 32 eggs in the refrigerator. She used 8 of the eggs to make 12 pancakes for breakfast. She used the rest of the eggs to make some more pancakes for her neighbours. How many pancakes did she make for her neighbours?

   Find the number of eggs she used in making the pancakes for her neighbours.

   32 − 8 = 24

   She used 24 eggs to make pancakes for her neighbours.

   8 eggs → 12 pancakes

   1 egg → $\frac{12}{8}$ pancakes

   24 eggs → $\frac{12}{8} \times 24$ pancakes

   = ____ pancakes

   She made ____ pancakes for her neighbours.

1. To make a salt solution, a scientist dissolves 9 g of salt in 1.5 l of water. What are the missing numbers in the table below?

Salt (g)	9	18	36	
Water (l)	1.5			15

2. The total cost of 3 packets of chips is \$2.40. Find the cost of 8 such packets of chips.

3. John added 2 cubes of sugar for every 500 ml of coffee that he made.
   (a) Find the number of cubes of sugar he added if he made 2 l of coffee.
   (b) If he used 7 cubes of sugar, how much coffee did he make?

4. For every \$5 collected by a school during a charity bazaar, a company donated \$3. At the end of the charity bazaar, the company had donated \$3750. How much money did the school collect?

5. A typist can type 1500 words in half an hour. How many similar words can she type in 42 minutes?

6. A farmer requires 120 g of fertiliser for every 4 m^2 of his garden.
   (a) How much fertiliser does he require for 32 m^2 of his garden?
   (b) If he has 600 g of fertiliser, what area of his garden can he fertilise?

7. On a clock face, the minute hand moves $\frac{1}{3}$ of a complete round when the second hand moves 20 rounds. If the second hand has moved 15 rounds, what fraction of a complete round will the minute hand have moved?

8. 4 pairs of white socks are priced at \$7.20 at a shop. A shopkeeper sold 12 such pairs of white socks to one customer and 18 such pairs to another customer. How much money did he collect altogether from the 2 customers?

Workbook 6A Part 1
Chapter 1
Worksheet 4

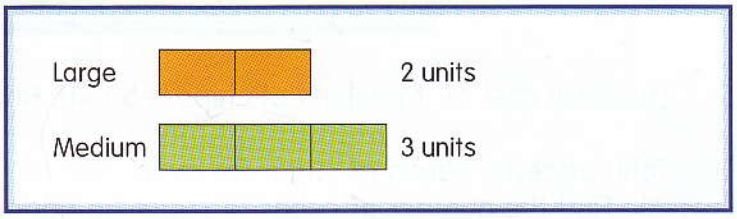
C More on ratio and direct proportion

Let us look at some examples that involve 2 ratios.

1. A carton contains 3 sizes of T-shirts: small, medium and large. The ratio of the number of large T-shirts to the number of medium T-shirts is 2 : 3 while the ratio of the number of medium T-shirts to the number of small T-shirts is 1 : 2. Find the ratio of the number of large T-shirts to that of the medium T-shirts to that of the small T-shirts.

1st ratio

Large : Medium
2 : 3

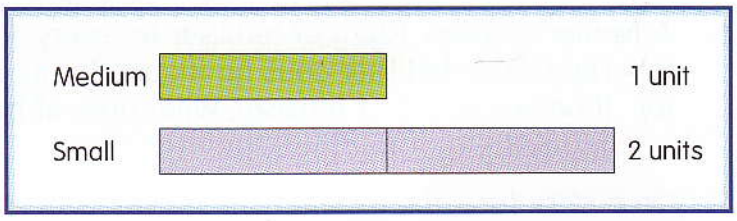


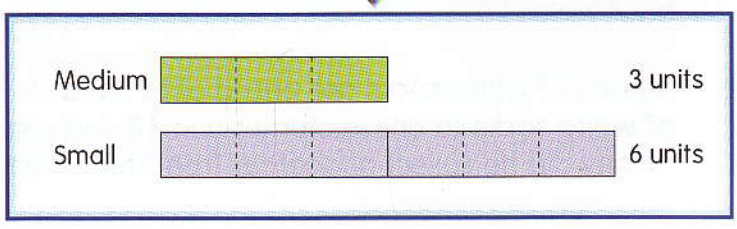
The length of the bar for medium T-shirts must be the same for both models.

Use equivalent ratios to make them the same.

2nd ratio

Medium : Small
1 : 2





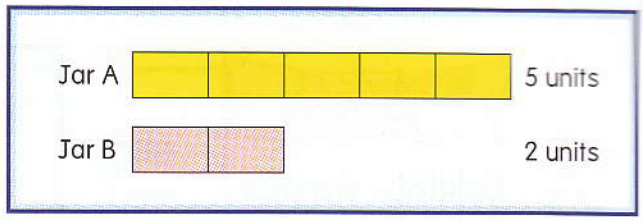
Medium : Small
1 : 2
= 3 : 6

The ratio of the number of large T-shirts to that of the medium T-shirts to that of the small T-shirts is 2 : 3 : 6.

2. Jars A, B and C are filled with water such that the ratio of the amount of water in Jar A to that in Jar B is 5 : 2 and the ratio of the amount of water in Jar B to that in Jar C is 4 : 5. Find the ratio of the amount of water in Jar A to that in Jar B to that in Jar C.

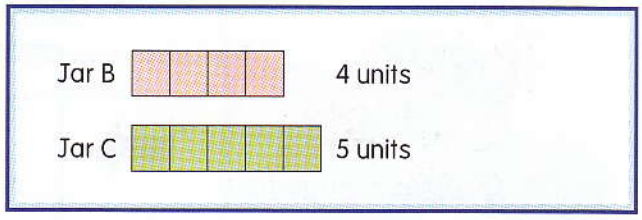
1st ratio

Jar A : Jar B
5 : 2

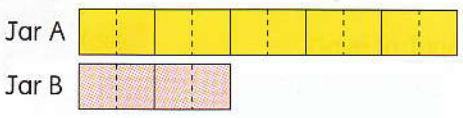


2nd ratio

Jar B : Jar C
4 : 5



We can again use equivalent ratios to make the number of units for Jar B the same in the 2 ratios.

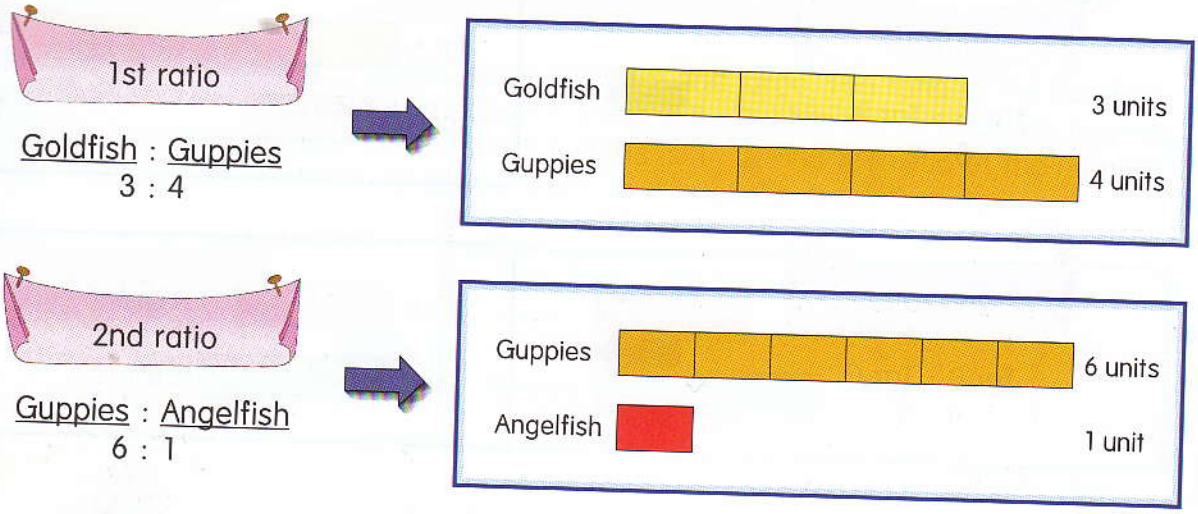


Jar A : Jar B
5 : 2
= ☐ : 4

The ratio of the amount of water in Jar A to that in Jar B to that in Jar C is ☐ : ☐ : ☐.

3. A pond contains 3 kinds of fish – goldfish, guppies and angelfish. There are altogether 46 fish in the pond. The ratio of the number of goldfish to the number of guppies is 3 : 4. The ratio of the number of guppies to the number of angelfish is 6 : 1.
(a) Find the ratio of the number of goldfish to the total number of fish in the pond.
(b) Find the number of goldfish in the pond.

(a)



Goldfish : Guppies
3 : 4
= 9 : **12**

Guppies : Angelfish
6 : 1
= **12** : 2

Make the number of units for the guppies the same.

9 + 12 + 2 = 23 units

The ratio of the number of goldfish to the total number of fish in the pond is 9 : 23.

(b) 23 units = 46 fish

1 unit = $\frac{46}{23}$ fish

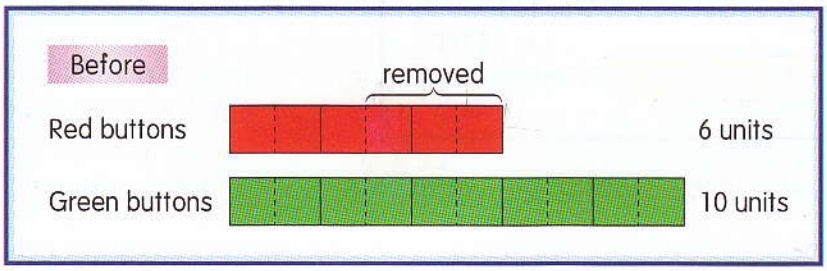
9 units = $\frac{46}{23} \times 9$ fish

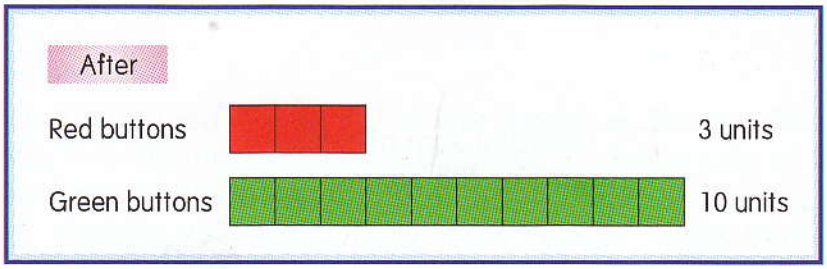
= ____ fish

There are ____ goldfish in the pond.

Here are some examples involving changing ratios.

4. The ratio of the number of red buttons to the number of green buttons is 3 : 5. If half of the red buttons are removed, what is the new ratio of the number of red buttons to the number of green buttons?

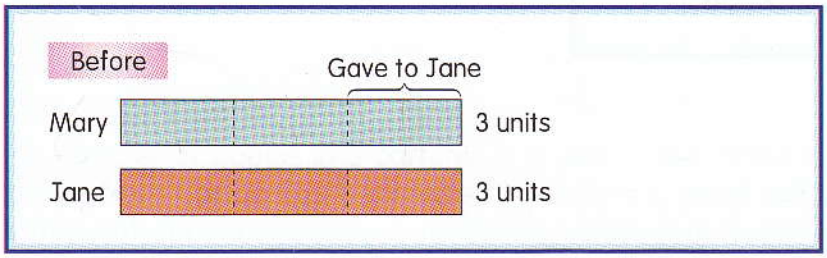


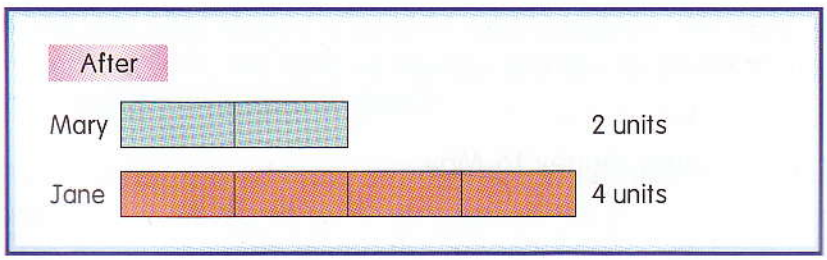


3 : 5 = 6 : 10

The new ratio is 3 : 10.

5. Mary and Jane had an equal number of cookies. If Mary gave $\frac{1}{3}$ of her cookies to Jane, find the new ratio of the number of Mary's cookies to the number of Jane's cookies.



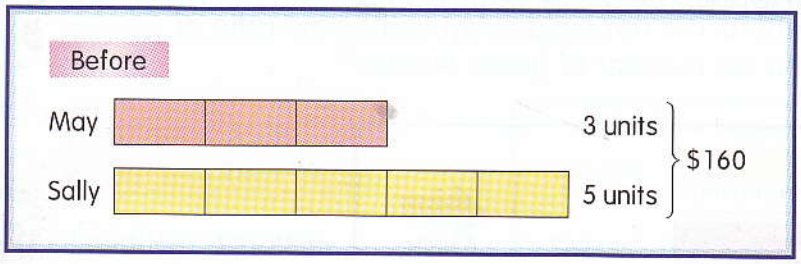


1 : 1 = 3 : 3

2 : 4 = 1 : 2

The new ratio is 1 : 2.

6. May and Sally shared a sum of $160 in the ratio 3 : 5. After Sally gave some money to May, the ratio of May's share to Sally's share became 3 : 2. How much money did Sally give to May?



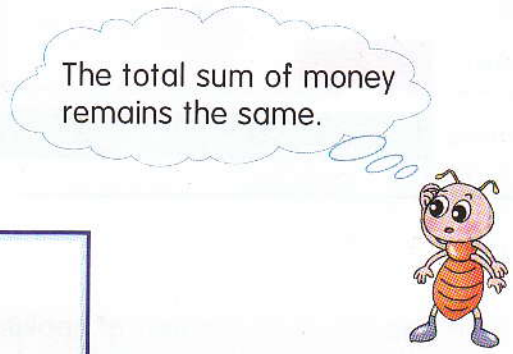
8 units = $160

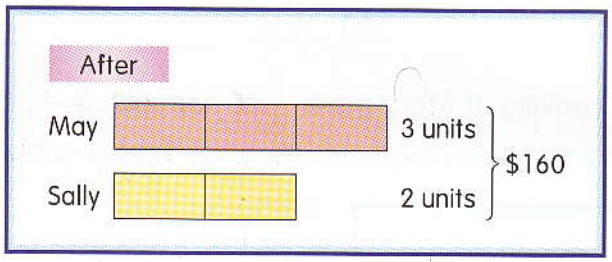
1 unit = $\frac{160}{8}$

5 units = $\frac{160}{8} \times 5$

= $ ____

Sally had $ ____ at first.





5 units = $160

1 unit = $\frac{160}{5}$

2 units = $\frac{160}{5} \times 2$

= $ ____

Sally had $ ____ after giving some money to May.

$ ____ − $ ____ = $ ____

Sally gave $ ____ to May.

1. The ratio of David's money to Ron's money is 3 : 1. The ratio of Ron's money to Jim's money is 3 : 5. Find the ratio of David's money to Ron's money to Jim's money.

2. 65 plums are shared among Jeya, Peggy and Rosnah. The ratio of the number of Jeya's plums to the number of Peggy's plums is 5 : 2. The ratio of the number of Peggy's plums to the number of Rosnah's plums is 1 : 3. How many plums does Rosnah have?

3. Mrs Tan divided 135 kg of rice into 3 bags, A, B and C. The ratio of the mass of rice in Bag A to the mass of rice in Bag B was 1 : 2. The ratio of the mass of rice in Bag B to the mass of rice in Bag C was 4 : 3.
   (a) Find the ratio of the mass of rice in Bag A to the mass of rice in Bag B to the mass of rice in Bag C.
   (b) Find the mass of rice in Bag B.

4. Sean and Alan had an equal amount of money. If Sean gave half of his share to Alan, find the new ratio of Alan's share to Sean's share.

5. The number of apples in 3 cartons, A, B and C, are in the ratio 1 : 2 : 3. If half of the apples from Carton C is transferred to Carton A, what will be the new ratio of the number of apples in Carton A to that in Carton B to that in Carton C?

6. David and Sam shared a total of 540 stamps in the ratio 3 : 2. After David gave some stamps to Sam, the ratio of David's stamps to Sam's stamps was 5 : 4. How many stamps did David give to Sam?

7. There were 20 children in a group. The ratio of the number of girls to the number of boys was 1 : 4. Some more girls joined the group and the ratio became 3 : 2. How many new girls joined the group?

Workbook 6A Part 1
Chapter 1
Worksheets 5 & 6

How can you cut this cake 4 times such that all the pieces are equal in size and the ratio of the size of each piece of cake to the size of the whole cake is 1 : 12?

Workbook 6A Part 1
Chapter 1
Skill Practice 1

Wrap-Up!

✓ We can express one value as a fraction of another given their ratio and vice versa.
Example: Green apples : Red apples
2 : 5

The number of green apples is $\frac{2}{5}$ of the number of red apples.

✓ Given the ratio of 2 quantities, we can find how many times one value is as large as another, and vice versa.
Example: Adults : Children
4 : 1
There are 4 times as many adults as children at a concert.

✓ When 2 quantities are in direct proportion, they increase or decrease by the same factor.

✓ Word problems on direct proportion can be solved by using the unitary method.

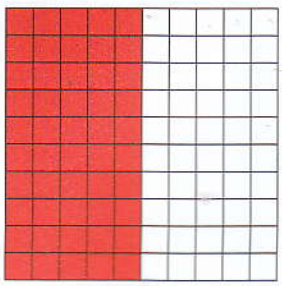
2 Percentage

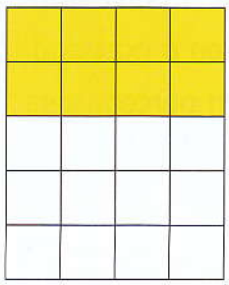
You will learn to

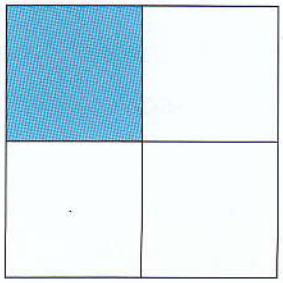
- express one quantity as a percentage of another.
- calculate the whole given a part and the percentage.
- solve word problems on percentages.

Recall.

What part of each whole below is shaded? Give your answer as a fraction, a decimal and a percentage.







$\frac{1}{100} = 0.01 = 1\%$

$\frac{10}{100} = 0.10 \text{ or } 0.1 = 10\%$

Lisa had 15 bowls of different colours. 20% of the bowls were blue. How many blue bowls did she have?

20% of 15 bowls = $\frac{20}{100} \times 15$

=

What is 20% of 15 ? = 3

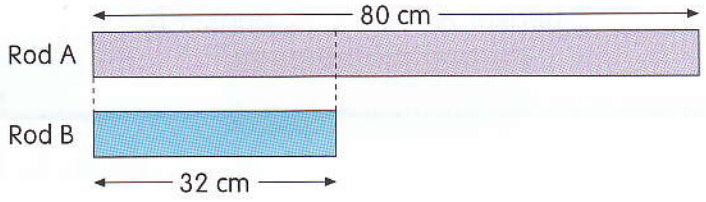
$\frac{\cancel{20}^{1}}{\cancel{100}_{5}} \times \cancel{15}^{3}$

Can you express the number of blue bowls as a percentage of the number of the remaining bowls?

A One quantity as a percentage of another

You have learnt how to express one quantity as a percentage of the whole. Let us see how we can express one quantity as a percentage of another quantity.

1. Rod A is 80 cm long. Rod B is 32 cm long. Express the length of Rod B as a percentage of the length of Rod A.



Method 1

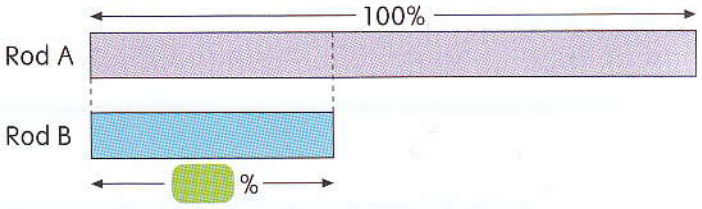
$80\text{ cm} \rightarrow 100\%$

$1\text{ cm} \rightarrow \frac{100}{80}\%$

$32\text{ cm} \rightarrow \frac{100}{80}\% \times 32$

$= 40\%$

Take the length of Rod A as 100%.



Method 2

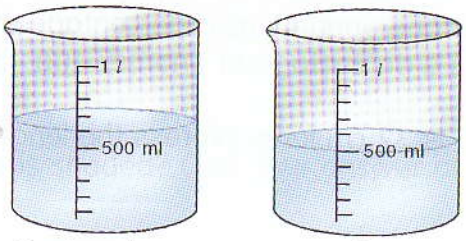
$\frac{\text{Length of Rod B}}{\text{Length of Rod A}} = \frac{32}{80}$

$\frac{32}{80} \times 100\% = 40\%$

We can also express this fraction as a percentage to get the answer.

The length of Rod B is 40% of the lenath of Rod A.

2. Look at the volumes of water in the 2 beakers below. Express the volume of water in Beaker A as a percentage of the volume of water in Beaker B.



Beaker A Beaker B

Method 1

$500 \text{ ml} \rightarrow 100\%$

$1 \text{ ml} \rightarrow \frac{100}{500}\%$

$600 \text{ ml} \rightarrow \frac{100}{500}\% \times 600$

$= 120\%$

Take the volume of water in Beaker B as 100%.

Method 2

$$\frac{\text{Volume of water in Beaker A}}{\text{Volume of water in Beaker B}} = \frac{600}{500}$$

$$\frac{600}{500} \times 100\% = 120\%$$

Recall that we can also express this fraction as a percentage to get the answer.

The volume of water in Beaker A is 120% of the volume of water in Beaker B.

3. What percentage of 2 kg is 150 g?

$\frac{150}{2000} \times 100\% =$ ____ %

2 kg = 2000 g

Make sure that both quantities are in the same units.

150 g is ____ % of 2 kg.

4. Express $1\frac{1}{2}$ h as a percentage of 40 min.

$\frac{90}{40} \times 100\% =$ ____ %

$1\frac{1}{2}$ h = 90 min

$1\frac{1}{2}$ h is ____ % of 40 min.

5. A metal pipe, measured 2 m long, was shortened to 1.5 m. What percentage of the pipe was removed?

2 − 1.5 = ____ m

$\frac{\text{____}}{2} \times 100\% =$ ____ %

____ % of the pipe was removed.

6. A pair of running shoes cost $180. During a sale, Lenny bought the pair of shoes for $153. Express the discount as a percentage of the usual price.

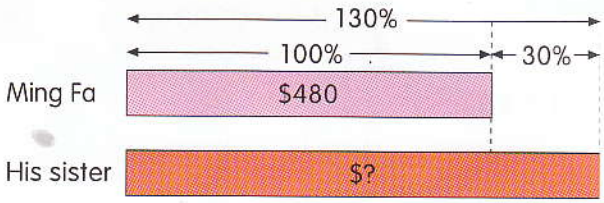
$180 − $153 = $ ____

The discount was $ ____.

$\frac{\text{____}}{180} \times 100\% =$ ____ %

The discount was ____ % of the usual price.

7. Ming Fa saves $480. His sister saves 30% more money than him. How much money does his sister save?



Ming Fa's sister's savings is 130% of his savings.

Method 1

$100\% \rightarrow \$480$

$1\% \rightarrow \$\frac{480}{100}$

$130\% \rightarrow \$\frac{480}{100} \times 130$

$= \$$ ____

Method 2

$130\% \text{ of } \$480 = \frac{130}{100} \times \$480$

$= \$$ ____

She saves $ ____ .

8. On Sean's 11th birthday, his height was 150 cm. On his 12th birthday, Sean measured his height again and found it to be 153 cm. What was the percentage increase in his height?

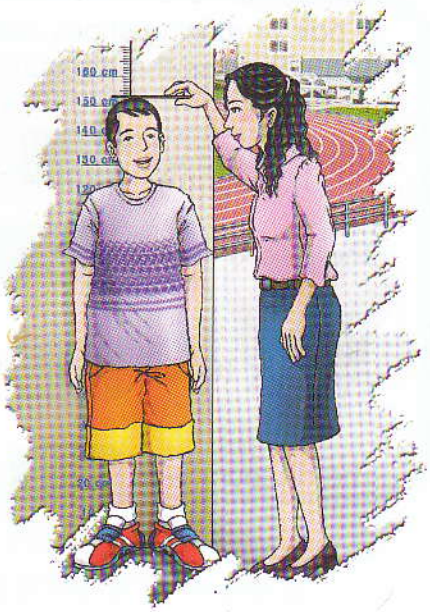
Increase in height $= 153 - 150$
$= 3$ cm

Sean's height increased by 3 cm.

To find the percentage increase in height, find the increase as a percentage of the original height.

$\frac{3}{\square} \times 100\% =$ ____ %

The percentage increase in his height was ____ %.



1. What percentage of $5 is 50¢?

2. What percentage of 24 hours is 6 hours?

3. Express 8.5 cm as a percentage of 5 cm.

4. String A is 48 cm long. String B is 36 cm long. Express the length of String B as a percentage of the length of String A.

5. The volume of water in Container X is 270 ml. The volume of water in Container Y is 120 ml. Express the volume of water in Container X as a percentage of the volume of water in Container Y.

6. The usual price of a fridge was $2000. During a promotion, the fridge was sold for $1700. Express the promotional price as a percentage of the usual price.

7. The ratio of the area of a trapezium to the area of a rectangle is 8 : 5. What percentage of the area of the rectangle is the area of the trapezium?

8. Mr Tan earned $3400 in January doing some freelance work. In February, he earned 15% less than the amount he earned in January. How much did he earn in February?

9. The usual price of two dozen eggs was $3. During the bird flu period, a minimart owner sold two dozen eggs for $5.70. Express this increase in price as a percentage of the original price.

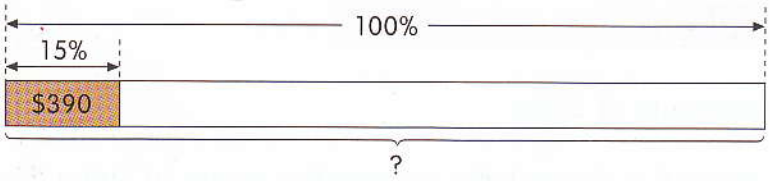
10. The table below shows Xavier's Mathematics test marks for two terms. What was the percentage decrease in his marks from the Term 1 Paper to the Term 2 Paper? (Give your answer correct to 1 decimal place.)

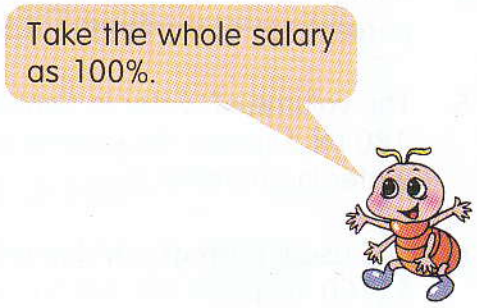
Mathematics Test	Total Marks is 50
Term 1	48
Term 2	34

Workbook 6A Part 1
Chapter 2
Worksheets 1 & 2

B Finding the whole

1. Lee Meng gives 15% of her salary to her mother every month. If her mother receives $390 from Lee Meng, what is Lee Meng's monthly salary?





$15\% \rightarrow \$390$

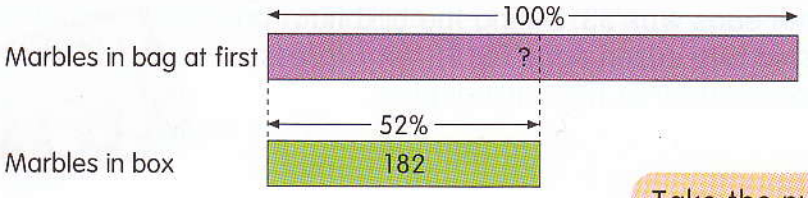
$1\% \rightarrow \$\frac{390}{15}$

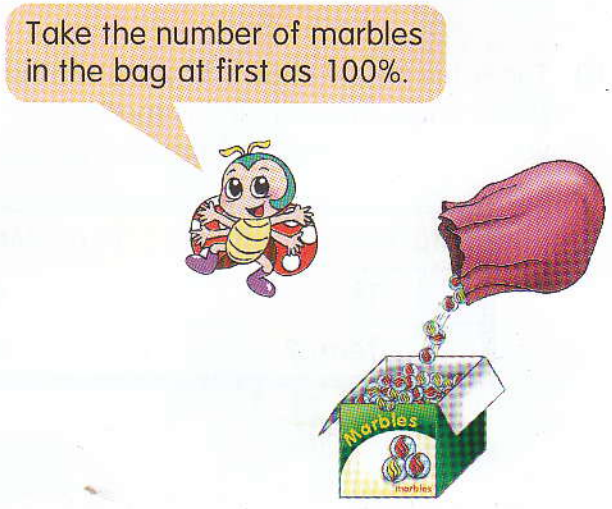
$100\% \rightarrow \$\frac{390}{15} \times 100$

$= \$2600$

Lee Meng's monthly salary is $2600.

2. 52% of the marbles in a bag were transferred into an empty box. If there are now 182 marbles in the box, how many marbles were there in the bag at first?





$52\% \rightarrow 182$ marbles

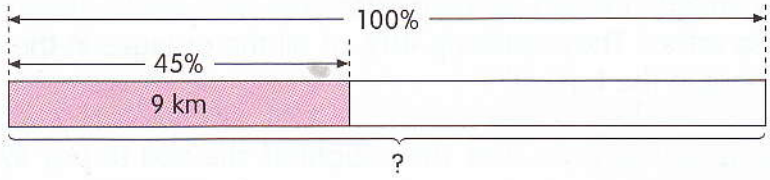
$1\% \rightarrow \frac{182}{52}$ marbles

$100\% \rightarrow \frac{182}{52}$ marbles $\times 100$

$= 350$ marbles

There were 350 marbles in the bag at first.

3. After cycling 9 km, a cyclist completed 45% of his journey.
   (a) What was the length of the whole journey?
   (b) How much further did he need to travel to complete the journey?



(a) 45% → 9 km

1% → $\frac{9}{45}$ km

100% → $\frac{9}{45}$ km × 100

= ____ km

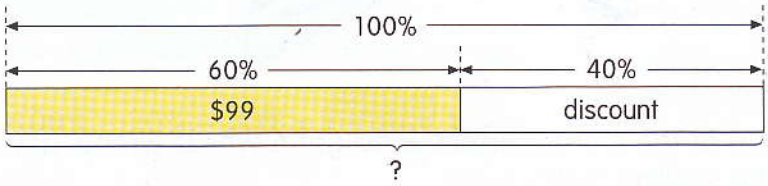
Take the whole journey as 100%.

The length of the whole journey was ____ km.

(b) ____ − 9 = ____ km

He needed to travel ____ km further to complete the journey.

4. At a Great Singapore Sale, a department store offered a 40% discount for all ladies' accessories. Julie bought a bracelet for $99 during the sale. What was the usual price of the bracelet?



100% − 40% = 60%

60% → $99

1% → $$\frac{99}{60}$$

100% → $$\frac{99}{60} \times 100$$

= $ ____

Take the usual price of the bracelet as 100%.

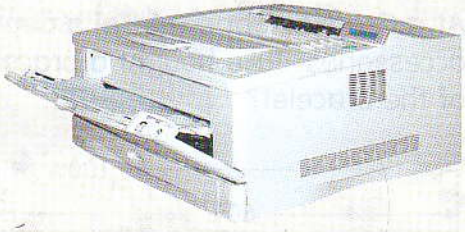
The usual price of the bracelet was $ ____.

1. 12 oranges in a basket are rotten. They make up 40% of all the oranges in the basket. How many oranges are there in the basket?

2. Mrs Samy paid 5% in GST for a frying pan that she bought. If she had to pay $2.30 for the GST, find the price of the frying pan before GST.

3. Ken spent 30% of his monthly allowance on a gift for his mother and had $98 left. How much was his monthly allowance?

4. Joseph bought a laser printer at a discount of 20% from a store. If he paid $360 for the laser printer, what was its usual selling price?



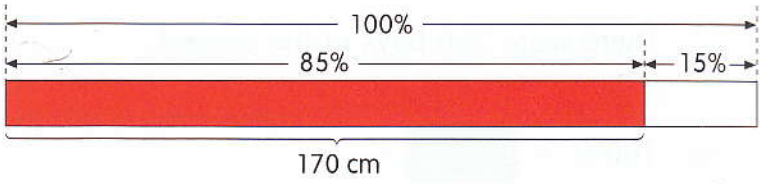
5. In a spelling test, Sean got 75% of the words correct. If he got 6 words wrong, how many words were tested in the spelling test?

6. An owner sold his car for $92 000, which was 20% lower than the price he had bought it for. How much did he pay for his car when he bought it?

C More word problems

1. Mary had a piece of rope. After she had cut some of it and used it to tie some parcels, the length of the rope was shortened by 15% to 170 cm. What was the original length of the rope?

The remaining length of the rope was 85% of the original length.



$100\% - 15\% = 85\%$

$85\% \rightarrow 170$ cm

$1\% \rightarrow \frac{170}{85}$ cm

$100\% \rightarrow \frac{170}{85}$ cm $\times 100$

$=$ ____ cm

The original length of the rope was ____ cm.

2. Steven read 20% of a book on Saturday and $\frac{1}{4}$ of the remaining pages on Sunday. If he had 270 more pages of the book left to read, how many pages were there altogether in the book?

$100\% - 20\% = 80\%$

$\frac{1}{4}$ of $80\% = \frac{1}{4} \times 80\%$

$= 20\%$

He read 20% of the book on Sunday.

$100\% - 20\% - 20\% =$ ____ %

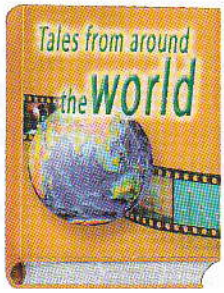
____ % $\rightarrow$ 270 pages

$1\% \rightarrow \frac{270}{\text{____}}$ pages

$100\% \rightarrow \frac{270}{\text{____}}$ pages $\times 100$

$=$ ____ pages

There were ____ pages in the book altogether.



Take the total number of pages in the book as 100%.

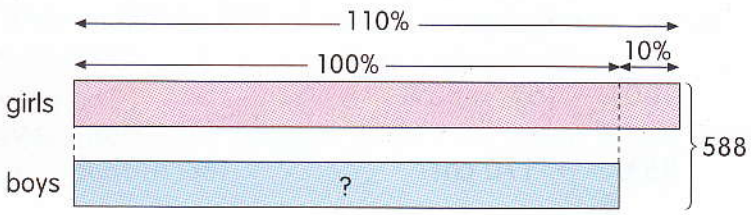
3. Of the 588 children attending a concert, the number of girls was 110% of the number of boys.
   (a) How many boys were there at the concert?
   (b) How many more girls than boys were there?

(a) 210% → 588 children

1% → $\frac{588}{210}$ children

100% → $\frac{588}{210}$ children × 100

= 280 children



There were 280 boys at the concert.

(b) 100% → [redacted]

1% → [redacted]

10% → [redacted]

There were [redacted] more girls than boys.

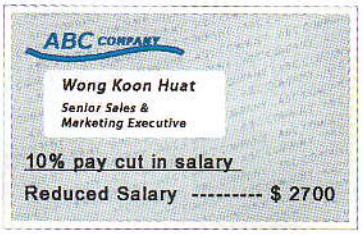
4. During an economic crisis, Mr Wong suffered a 10% pay cut and received a reduced salary of $2700. A year later, the company adjusted his salary upwards by 10%.
   (a) What was his salary before the pay cut?
   (b) What percentage of the original salary was the difference between the original salary and the adjusted salary?

(a) [redacted] % → $2700

1% → $ [redacted]

100% → $ [redacted]

Mr Wong's salary before the pay cut was $ [redacted].



(b) 10% of \$2700 $= \frac{10}{100} \times \$2700$

$= \$$ [ ]

Adjusted salary = \$2700 + \$ [ ] = \$ [ ]

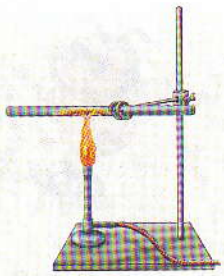
Difference between the original salary and the adjusted salary

= \$ [ ] − \$ [ ] = \$ [ ]

$\frac{\square}{\square} \times 100\% =$ [ ] %

The difference was [ ] % of the original salary.

1. After an iron rod was heated, its length increased by 10% to 220 cm. What was the original length of the iron rod?



2. Maria spent 25% of her pocket money on a pair of shoes and $\frac{1}{5}$ of the remainder on some stationery. She was then left with \$72. How much money did she have at the beginning?

3. 20% of a salt solution in a jar was used in an experiment. 5% of the remaining amount was poured away. The volume of the remaining salt solution in the jar was 190 ml. What was the original amount of salt solution in the jar?

4. On an aeroplane, 16% of the seats are allotted for business class passengers. The remaining seats are allocated for first class and economy class passengers. On a particular trip, the business class section was $\frac{3}{4}$ full with 36 passengers. What is the total number of seats on the plane?

5. Mr Lee kept 60% of his savings and divided the remaining savings of \$360 between his 2 sons, Chee Seng and Chee Meng in the ratio 3 : 2.
Express the amount received by Chee Meng as a percentage of the amount kept by Mr Lee.
(Give your answer correct to 1 decimal place.)

Workbook 6A Part 1
Chapter 2
Worksheet 4

Mr Johnson wants to sell his piano which he bought for $20 000. He tells the buyer a price which is 10% more than the original price.

The buyer disagrees and says that he will only buy the piano if Mr Johnson decreases the asking price by 10%.

Mr Johnson refuses and insists that he will lose money if he does that.

Do you agree? Explain your answer.

Workbook 6A Part 1
Chapter 2
Skill Practice 2

Wrap-Up!

✓ To express quantity A as a percentage of quantity B, we can use any one of the following 2 methods:
- Let quantity B represent 100%. Find the percentage represented by quantity A.
- Express quantity A as a fraction of quantity B and then convert this fraction to a percentage.

✓ When given a part of a whole and the percentage of the whole that it represents, we can find the whole by taking it to be 100%.

Review A

1. A new model of a car will cost \$126 760. Round off this amount to the nearest thousand dollars.

2. Round off 349 360 to the nearest hundred.

3. Find the missing numbers.

   (a) $34\,509 = 30\,000 + 4000 + \square + 9$

   (b) $12.345 = 12 + \frac{345}{\square}$

   (c) $7.125 = 7 + \frac{1}{\square} + \frac{\square}{100} + \frac{5}{\square}$

4. Write down all the common factors of each of the following pairs of numbers.

   (a) 24 and 40
   (b) 63 and 84

5. Find the value of each of the following.

   (a) $100 \times 4 - 350 \div 7$
   (b) $90 - 4 \times (14 - 5)$
   (c) $\frac{3}{4} \times \frac{8}{9}$
   (d) $\frac{5}{6} \div 12$

6. (a) Express 0.067 as a fraction.

   (b) Express $\frac{13}{4}$ as a decimal.

   (c) Express 5.75 as a mixed number in its simplest form.

7. Find the missing numbers in each of the following ratios.

   (a) $1 : 4 = 5 : \square$
   (b) $6 : 9 = \square : 27$
   (c) $16 : 8 : 32 = \square : \square : 8$
   (d) $4 : 5 : \square = 24 : \square : 36$

8. Which of the following fractions has the largest value?

$\frac{8}{9}$, $\frac{9}{11}$, $\frac{11}{12}$

9. Which of the following numbers are common multiples of 4 and 6?

12, 16, 20, 24, 30

10. Convert the following measurements.

(a) 2.67 kg = ____ g

(b) $\frac{9}{4}$ m = ____ cm

(c) 45.6 ml = ____ *l*

(d) 0.382 km = ____ m

11. A pipe supplies water to an empty tank at a rate of 8 litres every 20 seconds. How long will it take to fill the tank with 26 litres of water?

12. During a sale, the price of a dress was reduced by 24% to \$95. What was the original price of the dress?

13. The table below shows the taxi rates during off-peak hours. Lihua took a taxi and paid \$10.20 at the end of the journey. How far did she travel?

For the first km	\$2.20
For every additional 220 m	\$0.10

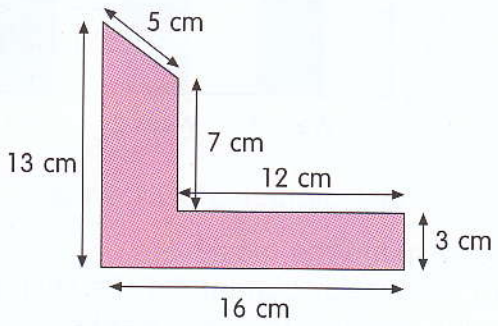
14. John's pocket money was $\frac{4}{5}$ of Jack's pocket money. When John spent \$12.60, his pocket money left was exactly $\frac{1}{2}$ of Jack's pocket money. How much pocket money did Jack have?

15. $\frac{1}{2}$ of the fish in a fish tank are swordtails. $\frac{1}{6}$ of the remainder are guppies. The rest are angelfish. There are 3 swordtails more than angelfish. How many fish are there in the fish tank?

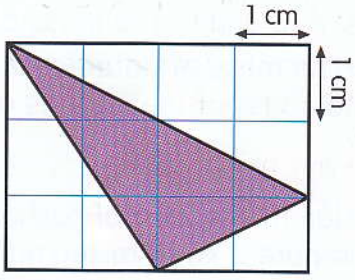
16. In a fruit basket, there are apples, oranges and grapefruits. The ratio of the number of apples to the number of oranges to the number of grapefruits is 2 : 3 : 5. If there are 18 more grapefruits than apples, how many oranges are there in the basket?

17. Meiling and Minghua both collect stamps. The number of Meiling's stamps is 60% of the number of Minghua's stamps. Minghua has 200 more stamps than Meiling. How many stamps do they have altogether?

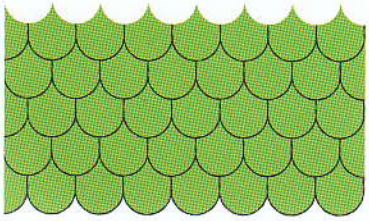
18. Find the area and the perimeter of the following figure.

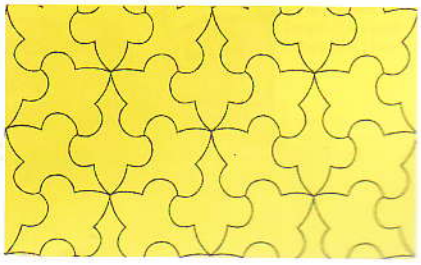


19. Look at the figure below.
    (a) Find the area of the shaded triangle.
    (b) Express the area of the shaded triangle as a fraction of the area of the rectangle.
    (c) Express the area of the shaded triangle as a percentage of the area of the rectangle. (Give your answer correct to 1 decimal place.)

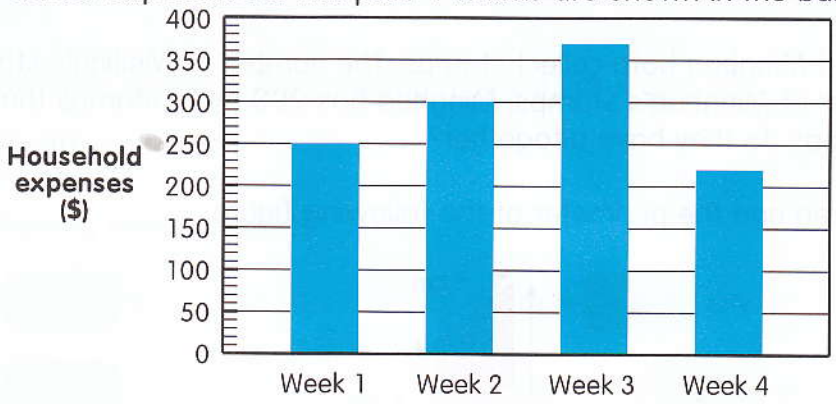


20. Trace and shade the unit shape that is used in each of the tessellations.

(a) 

(b) 

21. Every week, Mrs Tan was given $400 as a weekly budget to meet the household expenses. Her actual expenses for the past 4 weeks are shown in the bar graph below.



(a) In which week did she spend the most?
(b) What percentage of her weekly budget did she spend in Week 4?
(c) What was her average expense for the 4 weeks?

22. There were 1800 farm animals consisting of cows, goats and chickens in the ratio 5 : 6 : 9. When the farmer brought in another 297 new farm animals, the number of chickens increased by 20% and the number of goats increased by 10%.
(a) What was the percentage increase in the number of cows?
(b) What was the new ratio of the 3 types of animals?

23. Potatoes are kept in 3 sacks, A, B and C. The mass of potatoes in Sack A is $\frac{3}{5}$ of the mass of potatoes in Sack B. The mass of potatoes in Sack C is 80% of the mass of potatoes in Sack B. If the total mass of the 3 sacks of potatoes is 72 kg, what is the mass of potatoes in Sack C?

24. In preparing mixed nuts, Roslan mixes 24 g of cashew nuts, 12 g of almonds and 44 g of peanuts. If he needs to prepare 3 kg of mixed nuts, what is the mass of peanuts required?

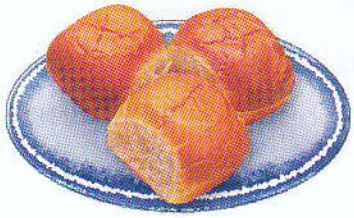
3 Algebra

You will learn to

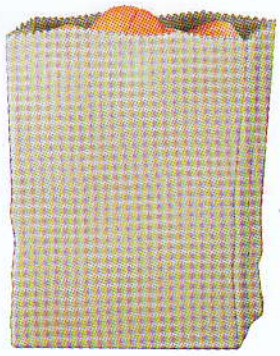
- use letters to represent unknown numbers.
- write algebraic expressions.
- simplify algebraic expressions.
- evaluate simple algebraic expressions.
- solve word problems involving algebraic expressions.

There are some buns in a bag and 3 buns on a plate. How many buns are there altogether if there are

(a) 5 buns in the bag?
(b) 7 buns in the bag?
(c) 12 buns in the bag?



3 buns



? buns

3 + 5 = 8

3 + 7 = 10

3 + 12 = 15

The number of buns in the bag is an unknown. We can use a letter to represent this unknown.

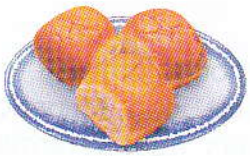
Let us say that there are *n* buns in the bag.
How many buns are there altogether now?

A Algebraic expressions

On the previous page, we used the letter n to represent the number of buns in the bag. The letter n is an unknown. It can represent any number.

1. How many buns are there altogether if there are n buns in the bag?

Number of buns in the bag	Total number of buns
5	3 + 5
7	3 + 7
12	3 + 12
n	3 + n



3 buns

n buns

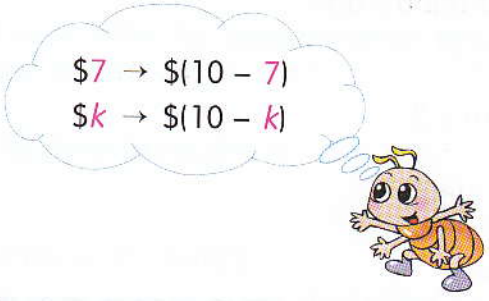
There are $(3 + n)$ buns altogether.

2. Mrs Lim had \$10 in her wallet.
   (a) If she spent \$7 on groceries, how much had she left?

   \$10 − \$7 = \$3

   She had \$3 left.

   (b) If she spent \$$k$ on groceries, how much had she left?



   She had \$$(10 - k)$ left.

   $(3 + n)$ and $(10 - k)$ are algebraic expressions.

Algebraic expressions contain unknowns which are letters that can have many different values.

Let us look at some more examples of algebraic expressions.

3. Sue, Linda and Amanda are sisters. Sue is the eldest and Amanda is the youngest. Sue is 3 times as old as Linda. Amanda's age is half of Linda's age. If Linda is m years old, what are her sisters' ages in terms of m?

Linda → m years old

Sue is 3 times as old as Linda.

Sue → $3 \times m$ or $m \times 3$
$= 3m$ years old

$3m$ is the same as $3 \times m$ or $m \times 3$. We do not need to write the multiplication sign.

Amanda's age is half of Linda's age.

Amanda → $\frac{1}{2} \times m$ or $m \div 2$

$= \frac{m}{2}$ years old

THINK

Is $\frac{1}{3}$ of x the same as $\frac{x}{3}$?

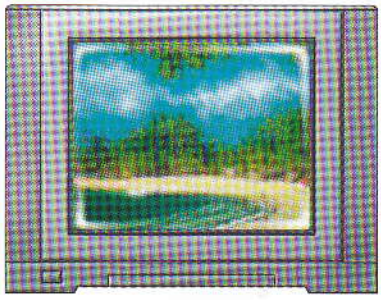
4. A basket contains y strawberries.
How many strawberries are there in 4 such baskets?

y strawberries y strawberries y strawberries y strawberries

Total number of strawberries $= y + y + y + y$
$= 4 \times y$
$=$ ____

5. A television set has a mass of 8 kg. A radio has a mass of w kg. What is the total mass of the television set and 5 such radios?

w kg



8 kg

Mass of the television set = 8 kg
Mass of the 5 radios = $5 \times w = 5w$ kg
Total mass = $(5w + 8)$ kg

6. Brandon bought some stamps. After he gave n stamps to each of his 4 friends, he had 10 stamps left. How many stamps did he buy?

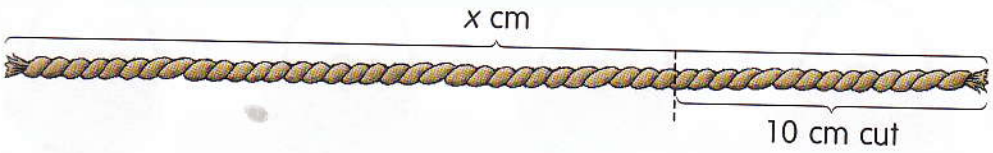
Total number of stamps he gave to his friends $= 4 \times n$
$=$ ____

Number of remaining stamps = 10 stamps

Total number of stamps = ____

He bought ____ stamps.

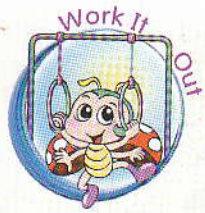
7. Jane had a piece of rope which measured x cm. 10 cm of it was cut off and used. She divided the remaining rope into a few smaller pieces, each of length 3 cm. How many smaller pieces did she have?



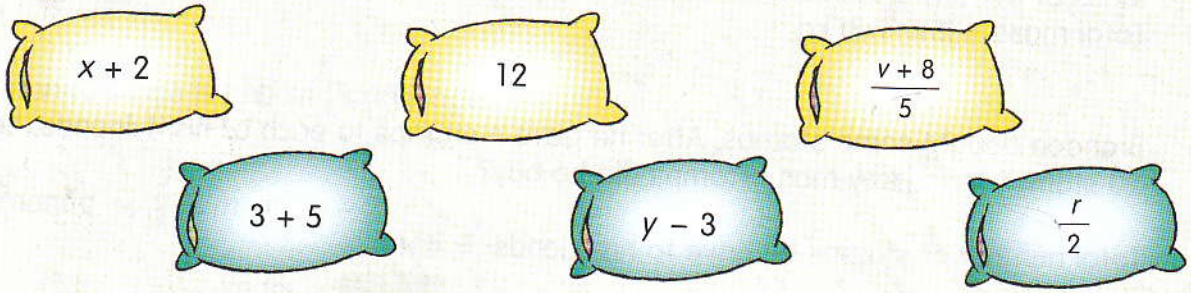
Length of the remaining rope = $(x - 10)$ cm
Number of smaller pieces = $(x - 10) \div 3$

$= \frac{\square}{\square}$

She had $\frac{\square}{\square}$ smaller pieces.



1. Which of the following are algebraic expressions?



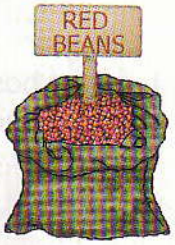
2. Father is x years old. How old will he be in 5 years' time?

3. Container A has 40 l of water. If w l of water is poured out from Container A into Container B, how much water is left in Container A?

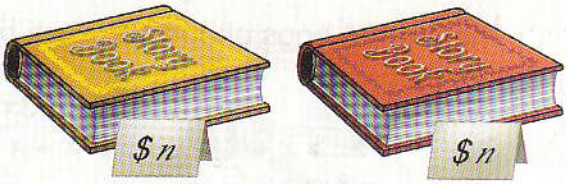
4. A bucket can hold p kg of sand. If we pour sand from 3 such full buckets into an empty sand pit, what is the total mass of sand in the sand pit?

p kg

5. r kg of red beans was divided among 4 sisters. How much red beans did each sister get?



6. Ken bought 2 books at \$$n$ each. He had \$15 left after paying for the books. How much money did Ken have at first?



7. Mr Tan bought 5 bottles of milk, each containing v ml of milk. He gave 200 ml of milk to his neighbour. How much milk did Mr Tan have left?

Workbook 6A Part 2
Chapter 3
Worksheet 1

B Simplifying algebraic expressions

The expressions $x + x$ and $y + y + y + y$ can be simplified in the following way:

$x + x = 2x$

$y + y + y + y = 4y$

$x = 1x$
$y = 1y$

How can we simplify the expression $5x + 3x$?

1. Lynn has 5 bags of red candies and 3 bags of green candies. Each bag contains x candies. How many candies does she have altogether?

There are 8 bags altogether. Each bag has x candies.

$$5x + 3x = \overbrace{x + x + x + x + x}^{5x} + \overbrace{x + x + x}^{3x}$$
$$= 8x$$

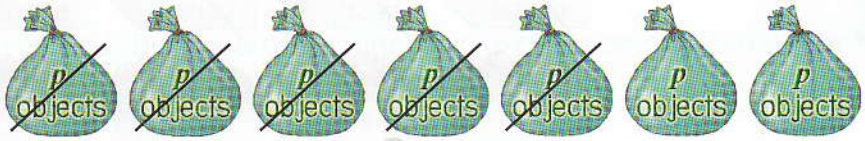
$5 + 3 = 8$

She has $8x$ candies altogether.

2. Simplify the expression $3y + 2y + y$.

$$3y + 2y + y = \overbrace{y + y + y}^{3y} + \overbrace{y + y}^{2y} + y$$
$$= \square$$

3. Simplify the expression $7p - 5p$.



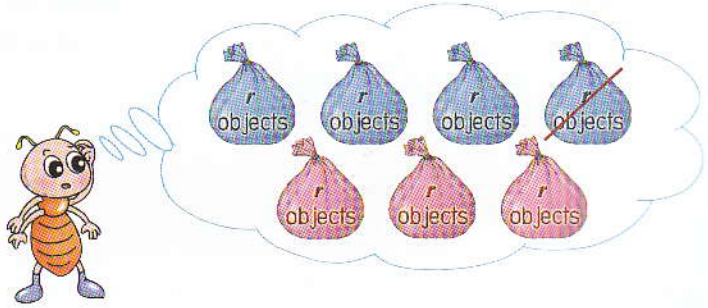
$$7p - 5p = p + p + \overbrace{p + p + p + p + p}^{5p}$$
$$= 2p$$

4. Simplify the expression $10z - 4z - 3z$.

$$10z - 4z - 3z = z + z + z + \overbrace{z + z + z + z}^{4z} + \overbrace{z + z + z}^{3z}$$
$$= \square$$

5. Simplify the expression $4r - r + 3r$.

$4r - r + 3r =$ ☐



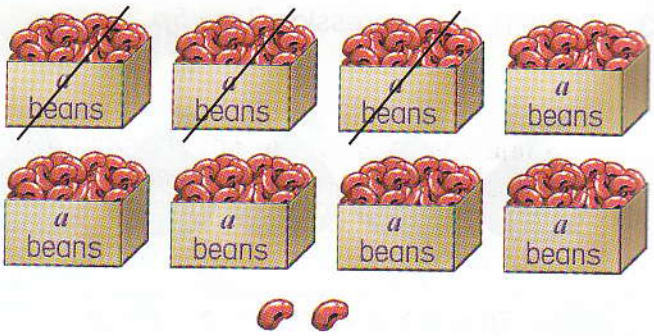
6. Simplify the expression $3a + 2a + 4$.

Let a be the number of beans in each box. There are altogether 5 boxes of a beans each and 4 additional beans.

$3a + 2a + 4 = 5a + 4$

7. Simplify the expression $8a + 2 - 3a$.

$8a + 2 - 3a =$ ____



8. Simplify the expression $3x + 17 + 2x + 3$.

$3x + 17 + 2x + 3 = 5x + 20$

Add the knowns and the unknowns separately:
$3x + 2x = 5x$
$17 + 3 = 20$

9. Simplify the expression $4w + 12 - 2w - 7$.

$4w + 12 - 2w - 7 =$ ____ + ____

$4w - 2w =$ ____

$12 - 7 =$ ____

1. Simplify the following algebraic expressions.

(a) $5n + 8n$
(b) $23h + 9h + 10h$
(c) $27s - 9s$
(d) $10h - 3h - 2h$
(e) $6m + 9m - 10m$
(f) $22z - 4z + 8z$
(g) $a + 5a + 2$
(h) $8q + 3q - 1$
(i) $15c + 4 - 12c$
(j) $66d - 7d + 10$
(k) $18r - 9 + 6r$
(l) $7x + 8 + 11x + 9$
(m) $4e + 11 + 10e + 2$
(n) $7f + 8 + 4f + f$
(o) $b + 14 - b + 2$
(p) $20a + 7 - 8a - 2$
(q) $35 + n - 1 + 2n$
(r) $16g - 8 - 10g + 5g$

Workbook 6A Part 2
Chapter 3
Worksheet 2

C Evaluating algebraic expressions

We can find the value of an algebraic expression if we know the value of the unknown in the expression. Look at the examples below.

1. Find the value of the expression $n + 10$ when
   (a) $n = 4$ (b) $n = 9$

Since n is an unknown, it can represent any number. Replace n in the expression with the numbers from above.

(a) $\boldsymbol{n} + 10 = \mathbf{4} + 10$
$= 14$

(b) $\boldsymbol{n} + 10 = \mathbf{9} + 10$
$= 19$

2. Find the value of the expression $15 - m$ when
   (a) $m = 3$ (b) $m = 8$

(a) $15 - \boldsymbol{m} = 15 -$ ____
$=$ ____

(b) $15 - \boldsymbol{m} = 15 -$ ____
$=$ ____

Replace m in the expression with the numbers from above.

3. Find the value of $5d$ and $\frac{d}{4}$ when $d = 20$.

$5d = 5 \times d$
$= 5 \times$ ____
$=$ ____

$\frac{d}{4} = d \div 4$
$=$ ____ $\div 4$
$=$ ____

4. Find the value of $3e + 5$ when $e = 4$.

$$\begin{aligned} 3e + 5 &= 3 \times 4 + 5 \\ &= 12 + 5 \\ &= 17 \end{aligned}$$

5. Find the value of $10 - 2h$ when $h = 3$.

$10 - 2h = 10 -$ ____

$=$ ____

Apply the correct order of operations.

6. Find the value of $\frac{2y - 11}{3}$ when $y = 10$.

$\frac{2y - 11}{3} = \frac{2 \times 10 - 11}{3}$

$=$ ____

1. Find the value of each of the following expressions when $y = 9$.

(a) $y + 5$ (b) $7 + y$ (c) $y - 8$ (d) $14 - y$

(e) $7y$ (f) $10y$ (g) $\frac{y}{3}$ (h) $\frac{y}{9}$

2. Given $x = 6$, find the value of the following expressions.

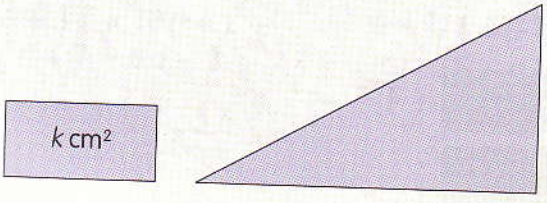
(a) $3x + 1$ (b) $4 + 4x$ (c) $25 - 2x$ (d) $8x - 5$

(e) $\frac{x + 9}{5}$ (f) $\frac{3x + 2}{2}$ (g) $\frac{5x - 3}{9}$ (h) $\frac{2x - 2}{5}$

3. The area of a rectangle is k cm^2. The area of a triangle is 3 times the area of the rectangle.

(a) Find the difference between the area of the triangle and the area of the rectangle.

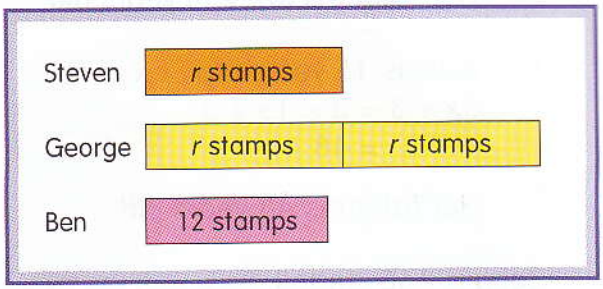
(b) If $k = 24$, what is the area of the triangle?



Workbook 6A Part 2
Chapter 3
Worksheet 3

D More word problems

1. Steven has r stamps. George has 2 times as many stamps as Steven while Ben has 12 stamps.
   (a) Express the total number of stamps the 3 boys have in terms of r.
   (b) If Steven has 13 stamps, how many stamps do the 3 boys have altogether?



(a) George has $2r$ stamps

$r + 2r + 12 = 3r + 12$

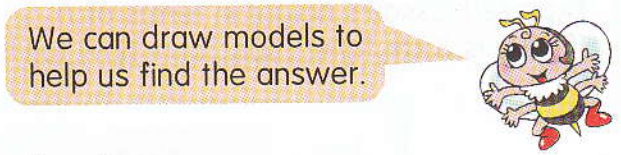
They have $(3r + 12)$ stamps altogether.

(b) Steven has 13 stamps → $r = 13$

$3r + 12 =$ ▒▒ $+ 12$

$=$ ▒▒

The 3 boys have ▒▒ stamps altogether.

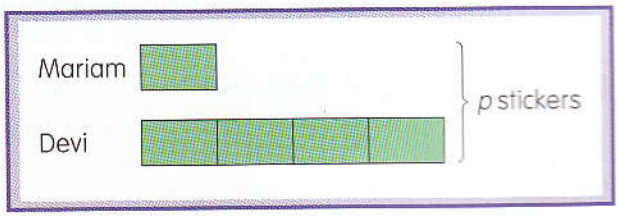


2. Devi has 4 times as many stickers as Mariam. They have p stickers altogether.
   (a) Express the number of stickers Mariam has in terms of p.
   (b) If $p = 60$, how many stickers does Mariam have?

(a) 5 units $=$ p stickers

1 unit $= \frac{p}{5}$ stickers

Mariam has $\frac{p}{5}$ stickers.



(b) If $p = 60$,

$\frac{p}{5} = \frac{60}{5}$

$= 12$

Mariam has 12 stickers.

3. Belle is x years old. Her mother is 3 times her age. Her father is 3 years older than her mother.
   (a) Express her father's age in terms of x.
   (b) If Belle is 15 years old, how old is her father?

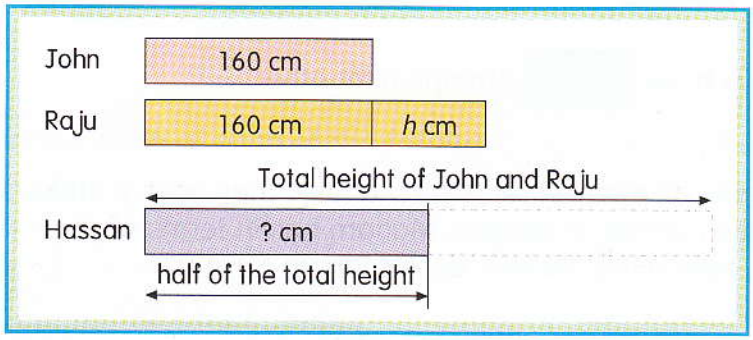
   (a) Belle → x years old, Mother → $3 \times x = 3x$ years old
   Father → $(3x + 3)$ years old

   Her father is $(3x + 3)$ years old.

   (b) Belle is 15 years old → $x = 15$
   $3x + 3 = 3 \times 15 + 3$
   $= 48$

   Her father is 48 years old.

4. John is 160 cm tall. Raju is h cm taller than John. Hassan's height is half of the total height of John and Raju.
   (a) Express Hassan's height in terms of h.
   (b) If Raju is 8 cm taller than John, how tall is Hassan?



   (a) Total height of John and Raju $= 160 + 160 + h$
   $= (320 + h)$ cm

   Hassan's height is $\left(\frac{320 + h}{2}\right)$ cm.

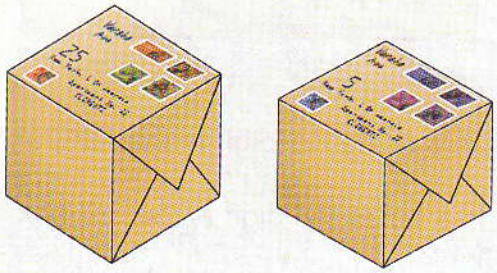
   (b) $h = 8$

   $\frac{320 + h}{2} = \frac{\square}{2}$

   $= \square$

   Hassan is $\square$ cm tall.

1. Parcel A has a mass of 5 kg. Parcel B has a mass of p kg.
   (a) What is the total mass of the 2 parcels in terms of p?
   (b) If $p = 3$, find the total mass of the 2 parcels.

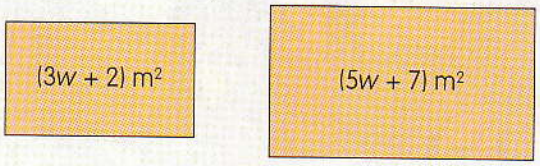


A B

2. Mrs Tan paid a cashier \$50 for 12 mangoes and received a change of \$$m$.
   (a) Express the price of each mango in terms of m.
   (b) If $m = 32$, what was the price of each mango?

3. There are 10 more boys than girls in a class. If there are x girls in the class,
   (a) express the number of boys in terms of x.
   (b) find the total number of boys and girls in the class if $x = 12$.

4. The area of rectangle C is $(3w + 2)$ m^2. The area of rectangle D is $(5w + 7)$ m^2.
   (a) What is the total area of rectangle C and rectangle D?
   (b) What is the total area of the 2 rectangles if $w = 16$?

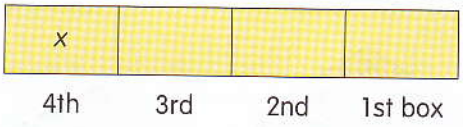


C D

5. A copper tube is y m long. A rubber tube is 5 times as long as the copper tube. The rubber tube is cut into 4 shorter tubes of equal length.
   (a) What is the length of each shorter rubber tube in terms of y?
   (b) What is the length of each shorter rubber tube if $y = 2$?

Workbook 6A Part 2
Chapter 3
Worksheet 4

There is a digit in each box below. The objective is to find a hidden 4-digit number. The digit in the 4th box is represented by the letter x.



Hint 1: The digit in the 2nd box is 3 times the digit in the 4th box.

Hint 2: The digit in the 1st box is 5 times the digit in the 3rd box.

Hint 3: There is a digit '1' among the 4 unknown digits.

Hint 4: The digit in the 4th box is 2.

What is this 4-digit number?

Workbook 6A Part 2
Chapter 3
Skill Practice 3

Wrap-Up!

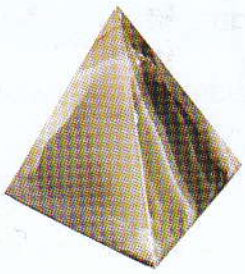
- ✓ An unknown quantity can be represented by a letter.
- ✓ When simplifying algebraic expressions, we add the unknowns and the knowns separately.
- ✓ We can find the value of an expression by replacing the unknown in the expression with a number.
- ✓ Algebraic expressions can be used to represent a problem.

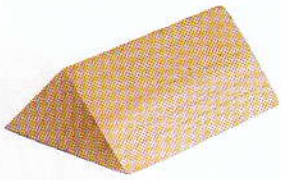
4 Solid Figures

You will learn to

- visualise solid figures from drawings.
- distinguish between prisms and pyramids.
- identify nets of cubes, cuboids, prisms and pyramids.
- make 3-D solids from given nets.
- identify the solid which can be formed by a net.

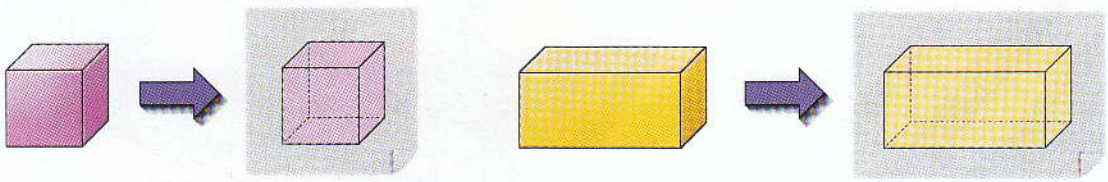
In Primary 4, you have learnt about cubes and cuboids. Can you identify the cube and the cuboid from the objects below?


What are the shapes of the other objects above?

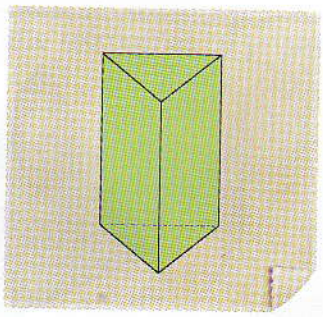
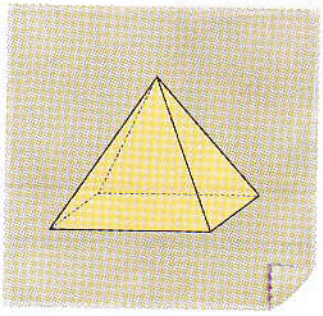
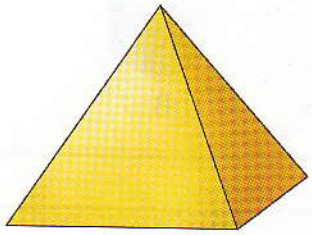
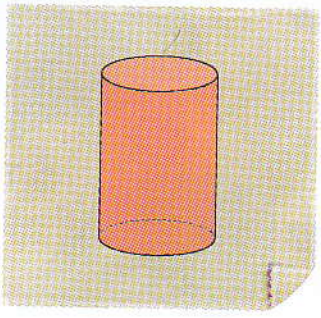
We can draw the shapes of cubes and cuboids on a piece of paper in the following way:



Can you think of how we can draw the shapes of the other objects above on a piece of paper?

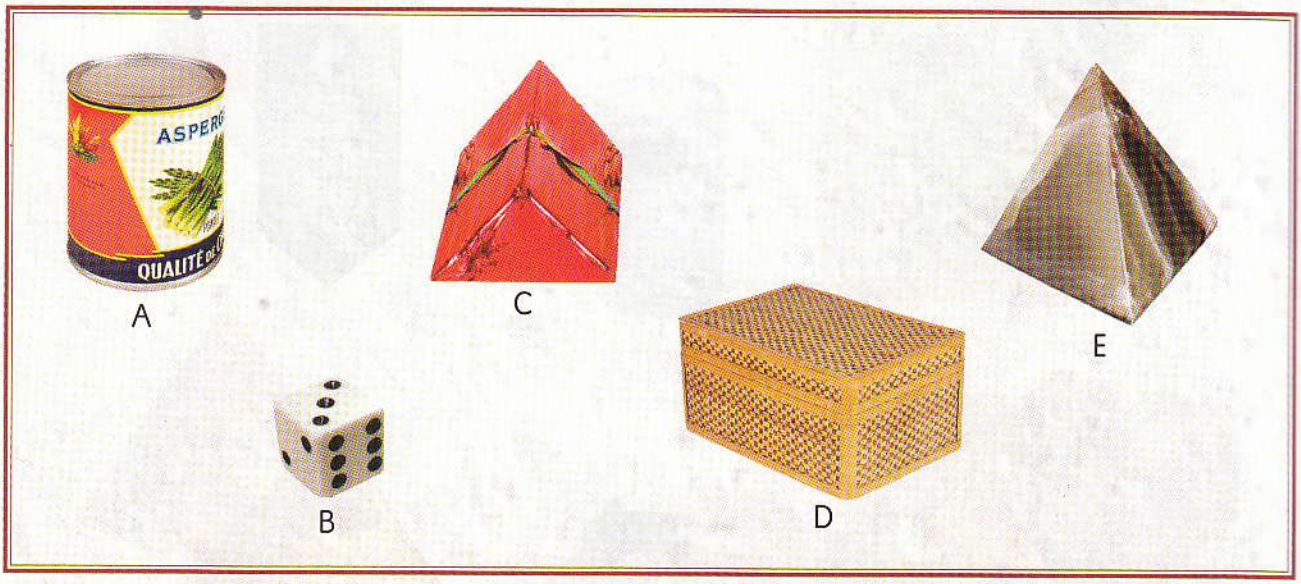
A Visualising solid figures from drawings

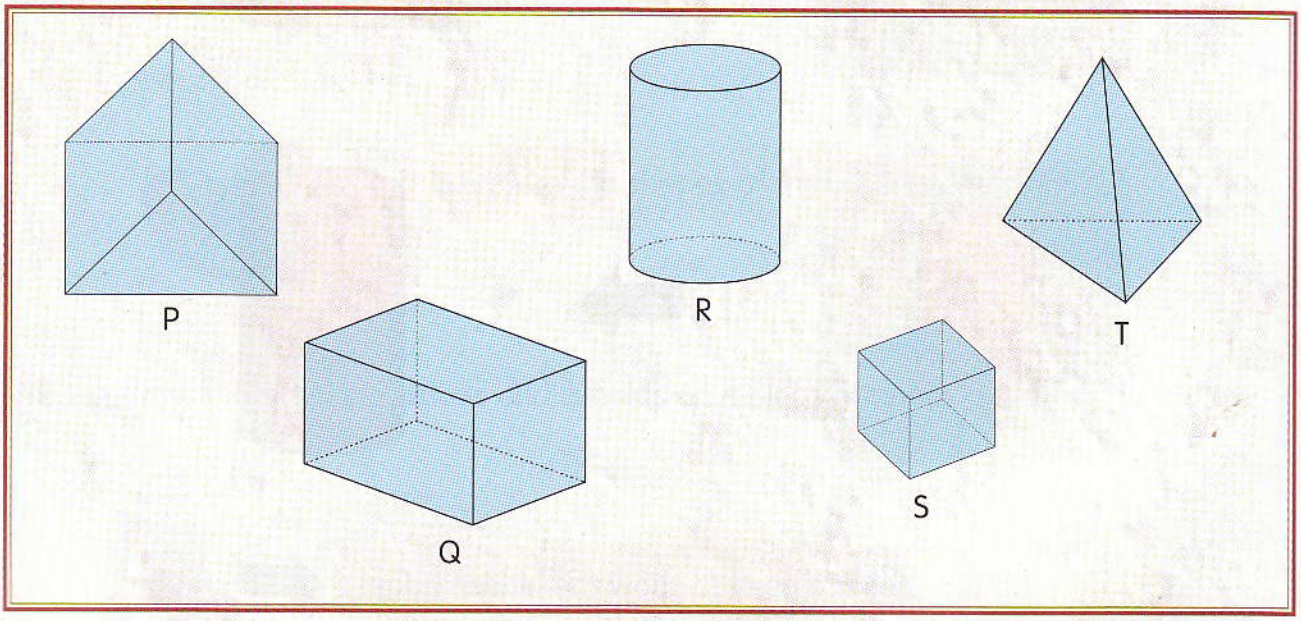
The diagrams below show the drawings of some solid figures on paper.

Drawings		Solids
	→	
	→	
	→	

Dotted lines are used to show the hidden edges.

1. Match these solids with their drawings shown below.





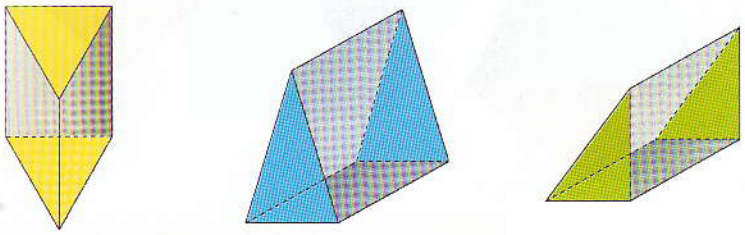
Workbook 6A Part 2
Chapter 4
Worksheet 1

B Prisms and pyramids

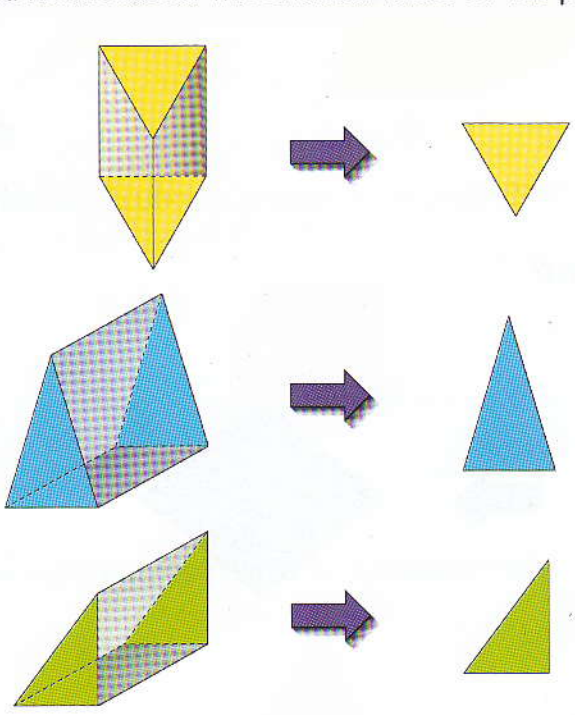
Some solid figures are classified as prisms or pyramids.

Prisms

Here are some examples of prisms.



What do you notice about the shaded faces of the prisms?

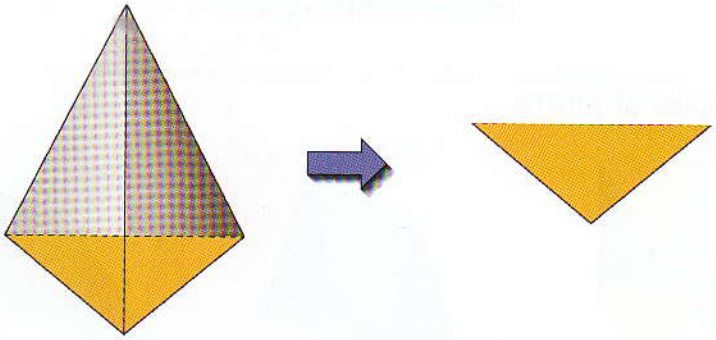


The faces at both ends have the same shape and same size.

The solid figure shown below is a cylinder. Is a cylinder a prism?

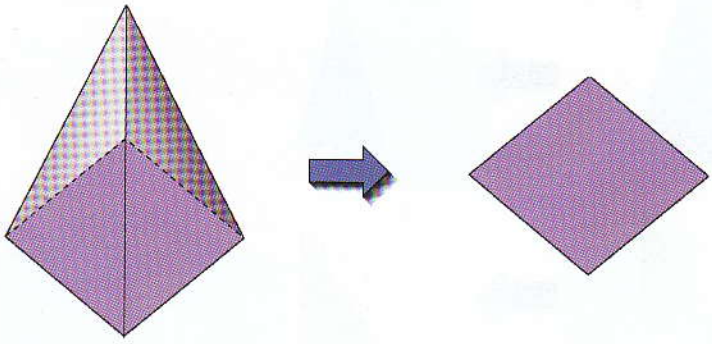
Pyramids

The solid figure shown below is a pyramid. What do you notice about the ends of this pyramid?



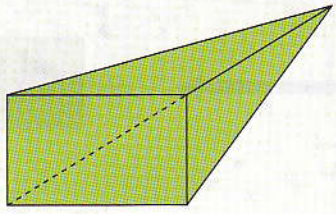
One end of the pyramid is a sharp point. The other end has the shape of a triangle.

Is the solid figure shown below a pyramid?

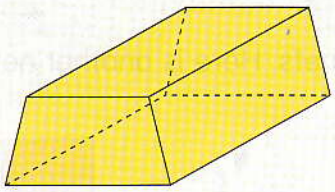


Name some objects around you that are in the shape of prisms and pyramids.

1. Look at solids A and B below. Which solid is a prism? Which solid is a pyramid?

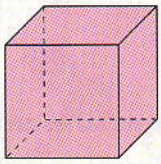


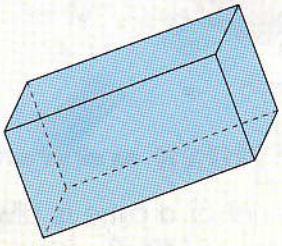
A



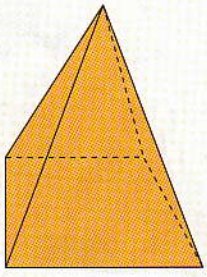
B

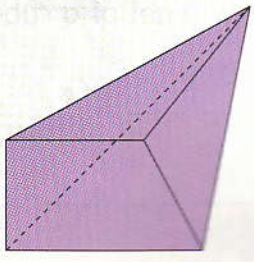
2. Are cubes and cuboids prisms or pyramids? Why?





3. Are the solid figures prisms or pyramids? Why?

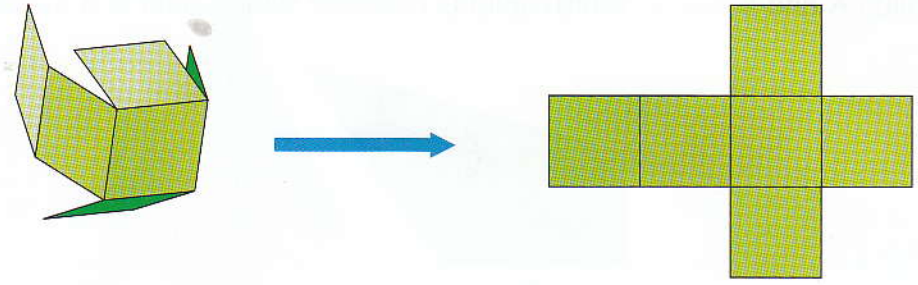




Workbook 6A Part 2
Chapter 4
Worksheet 2

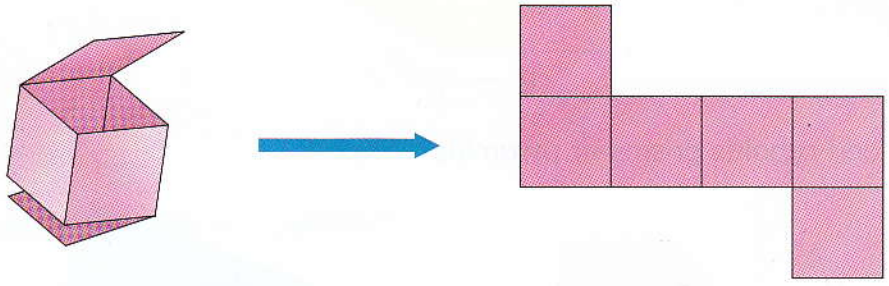
C Nets

If you open up a cube and lay it flat on the ground, this is what you will see:



The figure above on the right is called a net of the cube.

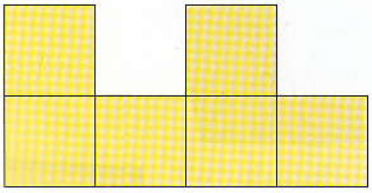
A solid can have several different nets. Here is another net of the same cube.

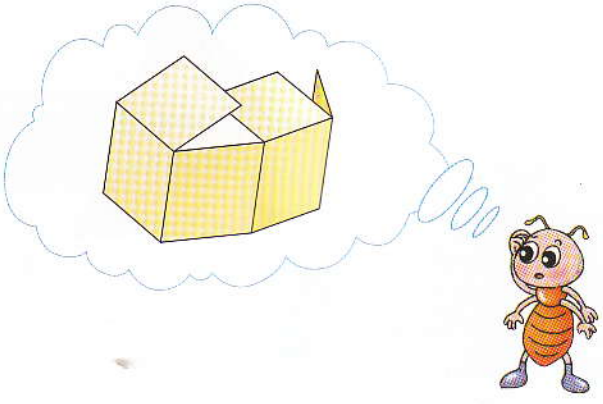


THINK

A net of a cube is always made up of 6 equal squares.
True or false?

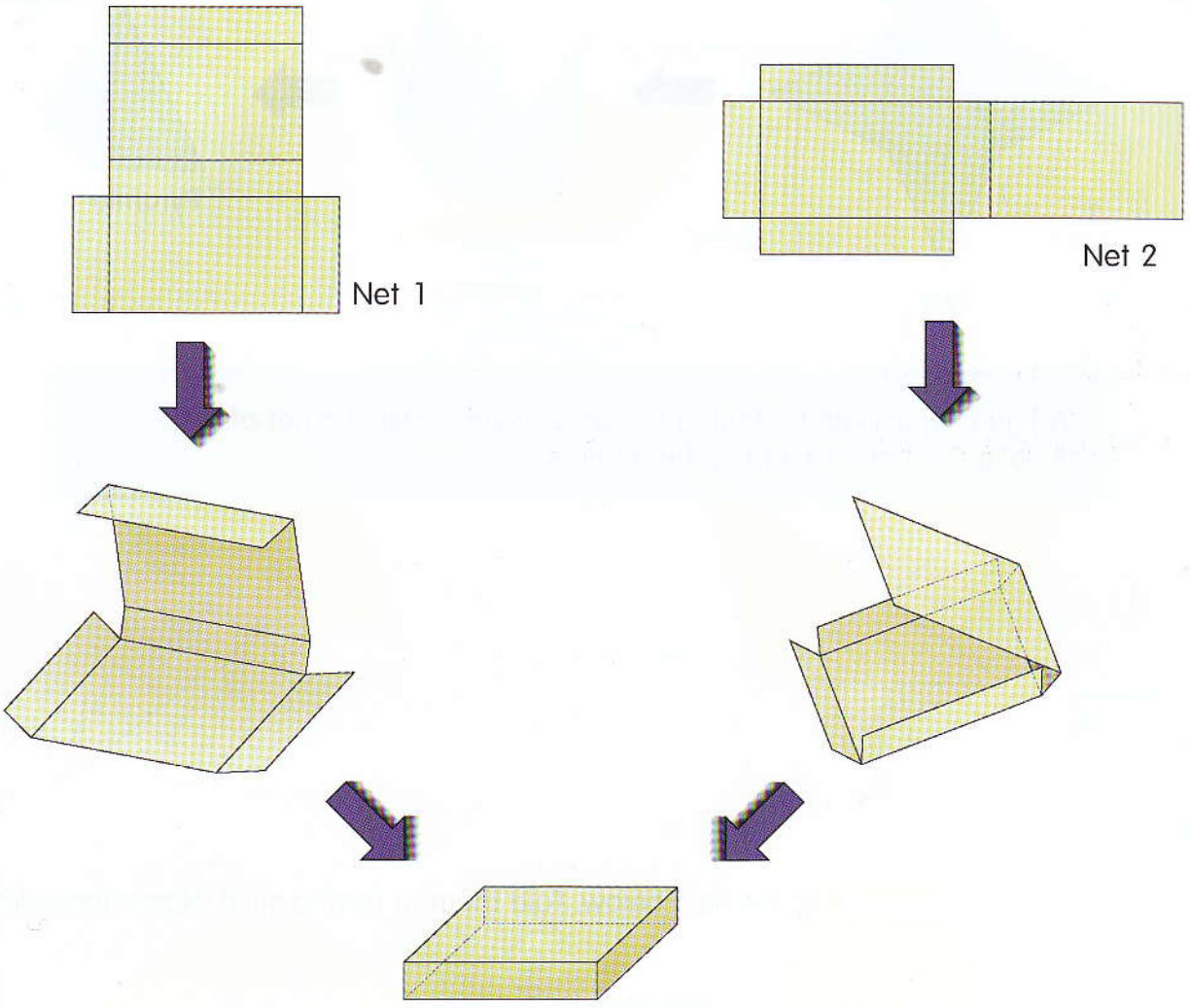
Is the figure shown below a net of a cube?



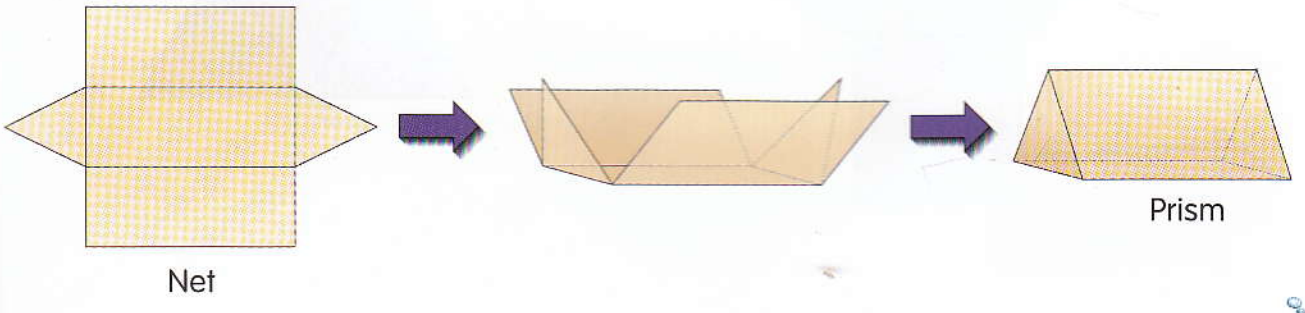


Let us look at some examples of nets for the other solid figures such as cuboids, prisms and pyramids.

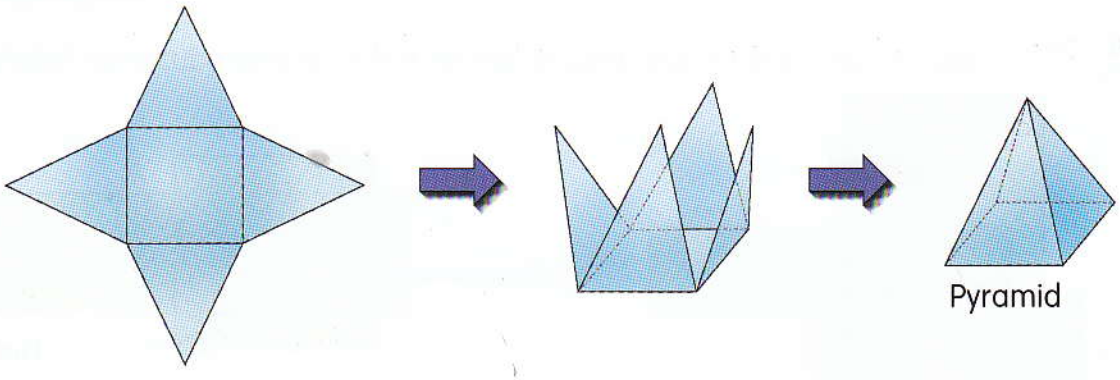
Cuboid



Prism



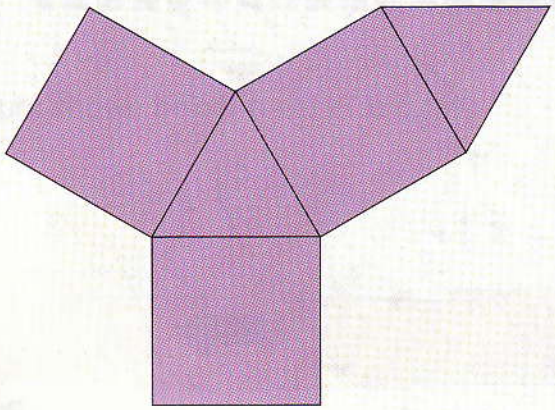
Pyramid



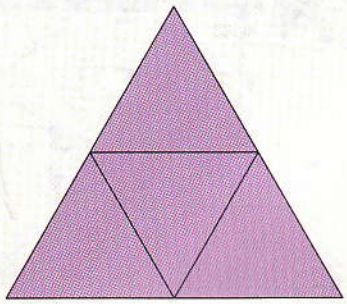
A figure which can be folded to form a solid is called a net of the solid.
A solid can have several different nets.

1. Trace and cut out each of the nets below. Fold them to form a solid. Name the solid that you get.

(a)

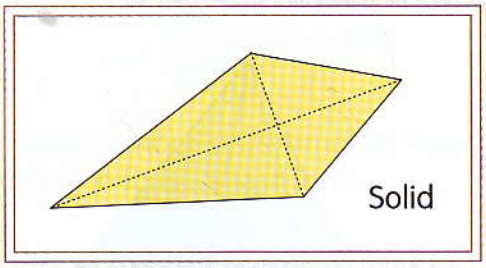


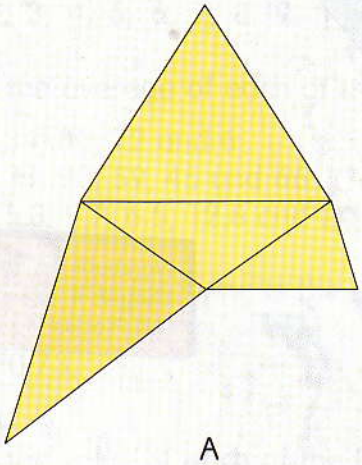
(b)



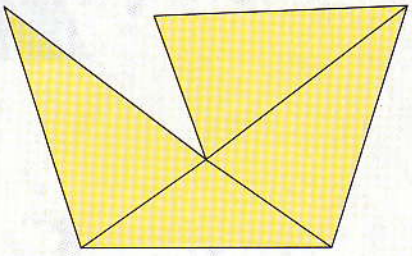
2. There are many ways of drawing a net of a cube. Can you draw a net that has not been shown on page 62?

3. The figure below shows a solid. Which of the following, A, B, C or D, is a net of the solid?

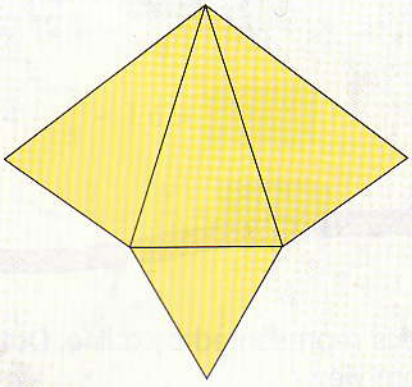




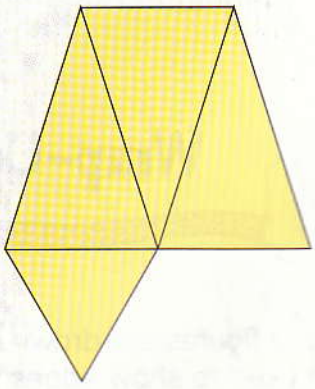
A



B



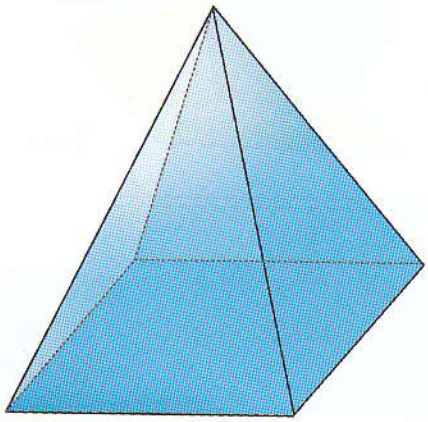
C



D

Workbook 6A Part 2
Chapter 4
Worksheets 3 to 5

Here is a pyramid. Can you draw all the possible nets?



Workbook 6A Part 2
Chapter 4
Skill Practice 4

Wrap-Up!

- ✓ When solid figures are drawn on paper, each edge is represented by a line. Dotted lines are used to show edges which are hidden from view.
- ✓ Solid figures can be classified as prisms or pyramids.
- ✓ A figure which can be folded to form a solid is called a net of the solid. A solid can have several different nets.

Review B

1. (a) Express $\frac{5}{4}$ as a decimal.

   (b) Express 1.062 as a mixed number in its simplest form.

   (c) Express 48% as a fraction in its simplest form.

2. Circle the common factors of 48 and 36 in the list below.

   1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12

3. Find the average of each of the following sets of numbers.

   (a) 34, 80, 72 and 6

   (b) 11, 90, 59, 45 and 66

   (c) 5.8, 9.7, 6.5, 12.8 and 20.2

4. Which of the following is the smallest?

   $\frac{5}{7}$, 0.73, $\frac{7}{11}$

5. Find the value of each of the following.

   (a) $0.125 = \frac{\square}{8}$

   (b) $4 - \frac{2}{5} - 1.6 = \square$

   (c) $\frac{2}{11} + \frac{7}{11} - \frac{5}{11} = \square \times \frac{1}{11}$

   (d) $\frac{1}{7} \times \frac{\square}{6} = \frac{1}{3}$

6. When $x = 8$, evaluate the following expressions.

   (a) $45 - 3x$

   (b) $18 + 5x$

   (c) $\frac{7x}{16}$

   (d) $\frac{3x - 4}{8}$

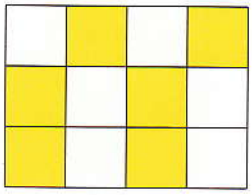
7. Mrs Jones gave $\frac{1}{5}$ of a cake to her neighbour. She then sliced the remainder into 3 pieces for her 3 sons, Ken, Ron and David in the ratio 1 : 3 : 4. What fraction of the cake was Ron's piece?

8. Simplify the following expressions.

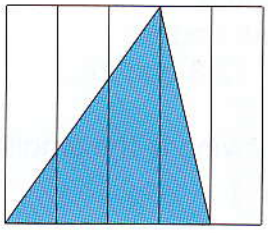
   (a) $9y - 4y + 3y - 10$
   (b) $23w + 7 + 2w - 4$
   (c) $16u - 9 - 7u$

9. What percentage of each figure is shaded?

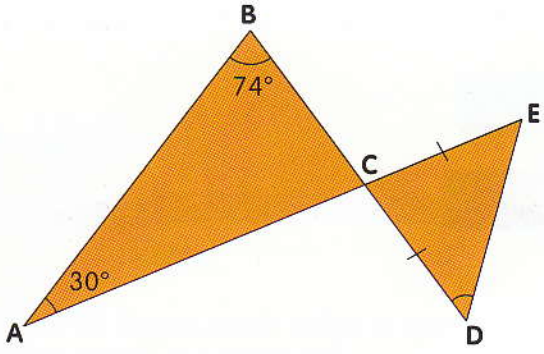
   (a)



   (b)



10. In the figure, BCD and ACE are straight lines and CDE is an isosceles triangle with CD = CE. Find $\angle CDE$.

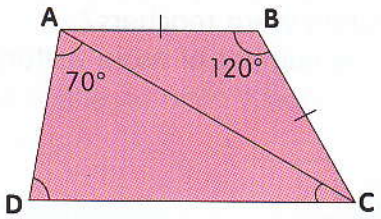


11. During a visit to the Singapore Science Centre, all the children were divided into 2 groups, Group A and Group B. Group A had 60 children. The ratio of the number of boys to the number of girls in Group A was 5 : 7. Group B had 50 children. The ratio of the number of boys to the number of girls in Group B was 3 : 2. How many boys were there altogether?

12. Xiaokang paid 5% in GST for a handphone that he bought. If he had to pay $20 for the GST, find the price of the handphone before GST.

13. Vivian scored an average of 78 marks for her 3 mathematics tests. If the average marks for 2 of her tests was 84, what marks did she get for her third test?

14. In the trapezium ABCD below, AB // DC and AB = BC. Find ∠ADC and ∠ACD.



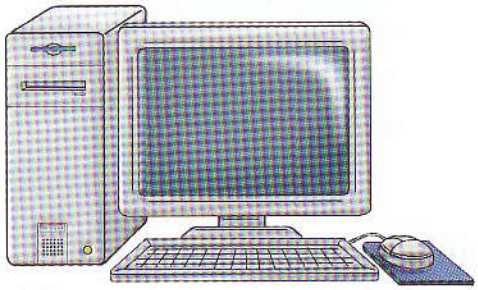
15. A class of pupils spent the day visiting some places of interest. $\frac{1}{4}$ of the time was spent on the coach. Of the remaining time, $\frac{1}{3}$ was spent on a visit to a butterfly farm, $\frac{4}{9}$ was spent on a visit to the zoo and the remaining 50 minutes was spent for lunch. Write your answers in hours and minutes.
    (a) What was the duration of the entire excursion?
    (b) What was the duration of their visit to the butterfly farm?

16. Mrs Tan took 1 h 17 min to complete a task and 2 h 5 min to complete another task. What was the average duration of the 2 tasks?

17. There were 9 *l* 300 ml of water in a container. Maria used up 3 *l* 600 ml of the water for an experiment and kept the remaining liquid in 4 jars in equal amounts. How much water did each jar contain?

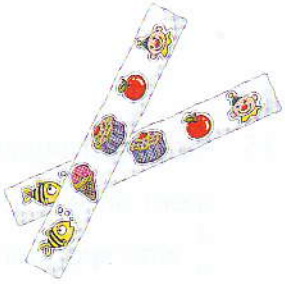
18. The table shows the different types of visitors who attended a computer fair.

Type of visitors	Male	Female
IT professionals	1100	1300
Teachers	400	380
General public	1700	1120



(a) How many teachers visited the computer fair altogether?
(b) What percentage of the visitors were IT professionals?
(c) What fraction of the visitors were teachers?
(d) What was the ratio of the number of male visitors to the number of female visitors?

19. Lihong, Fanyi and Anne have 720 stickers altogether. Fanyi has 90 stickers. Anne has 3 times the total of Fanyi's and Lihong's share.

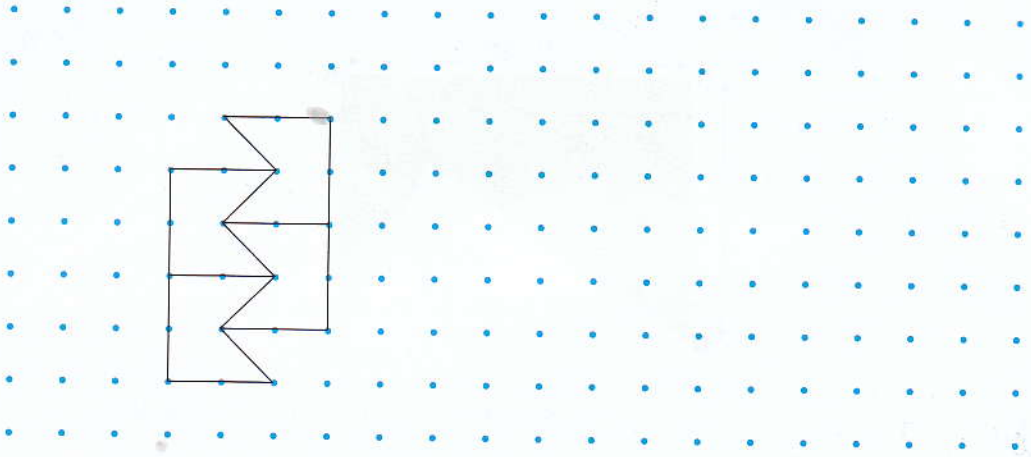


(a) How many stickers does Lihong have?
(b) What is the ratio of the number of Lihong's stickers to the number of Fanyi's stickers to the number of Anne's stickers?

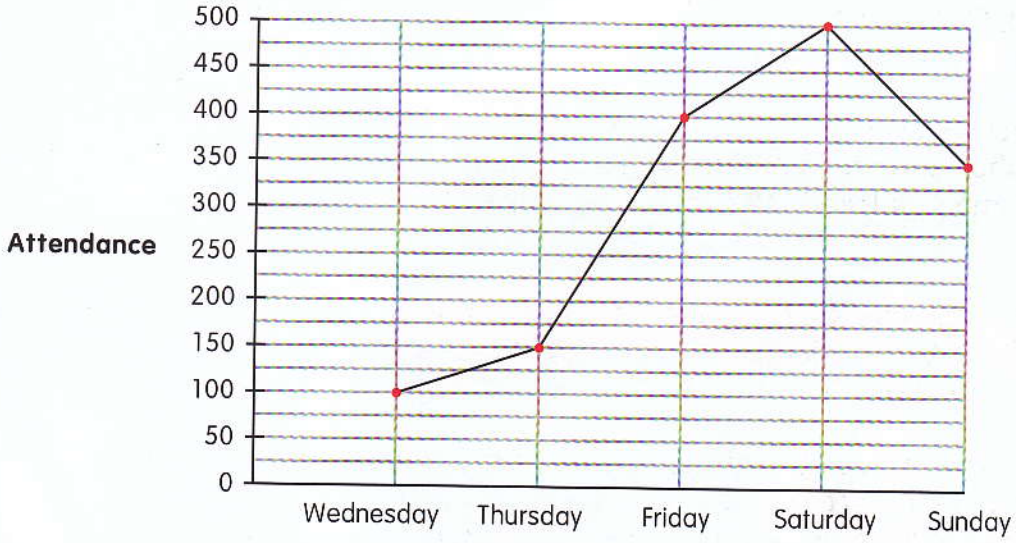
20. A florist had 400 stalks of flowers consisting of orchids, roses and tulips in the ratio 11 : 7 : 2. After a half day's business, the number of orchids decreased by 20% and the number of roses decreased by 30%.

(a) What was the new ratio of the number of orchids to the number of roses to the number of tulips?
(b) What was the overall percentage decrease in the number of flower stalks?

21. Extend the following tessellation by drawing 4 more unit shapes.

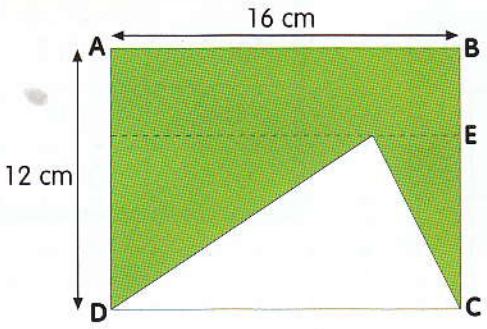


22. The number of people going to a cinema from Wednesday to Sunday is represented by the line graph below.



(a) Which day saw the highest increase in attendance?
(b) What was the decrease in the number of people from Saturday to Sunday?
(c) Express Friday's attendance as a percentage of the total attendance over the 5 days. (Give your answer correct to 1 decimal place.)
(d) What was the average daily attendance over these 5 days?

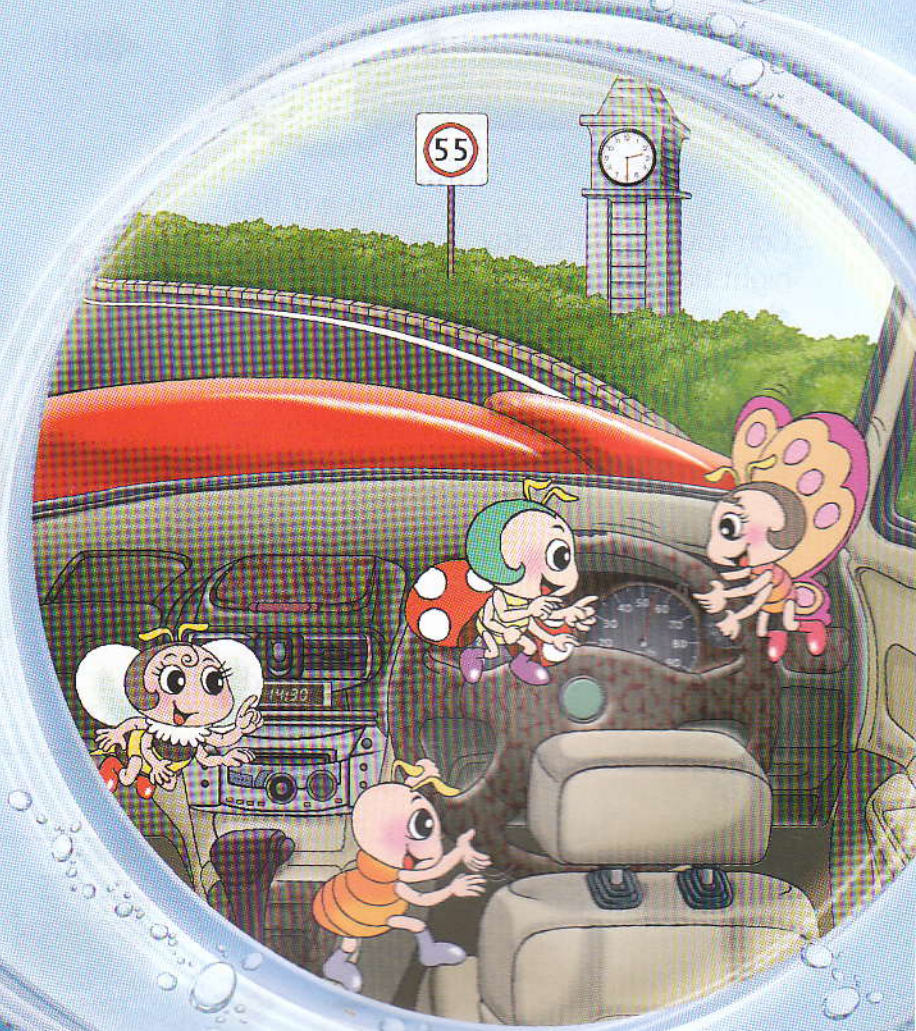
23. In rectangle ABCD shown below, the ratio BE : EC = 1 : 2. Find the area of the shaded portion of the rectangle.



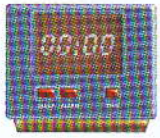
5 Time And Speed

You will learn to

- interpret the 24-hour clock.
- convert time between 12-hour and 24-hour clocks.
- find duration of time.
- calculate speed, distance and time.
- solve word problems on speed.



Can you read the times shown on these clocks?



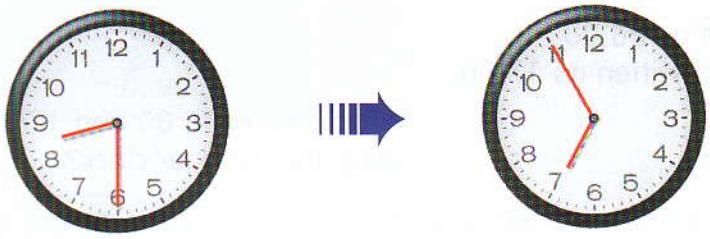
Can you tell if it is day time or night time by looking at the times shown on the clocks above?

Look at the signboard in the picture. Have you seen it before? What does it mean?

A Telling time on a 24-hour clock

Jason started work at eight thirty in the morning and left the office at six fifty-five in the evening.

The clocks below show the times Jason started work and left his office.



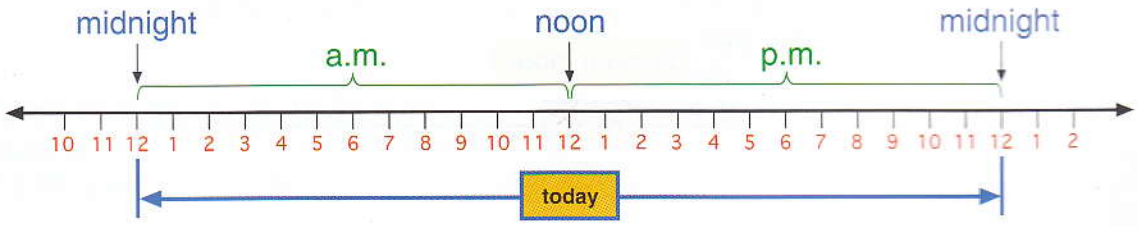
Started work

Left the office

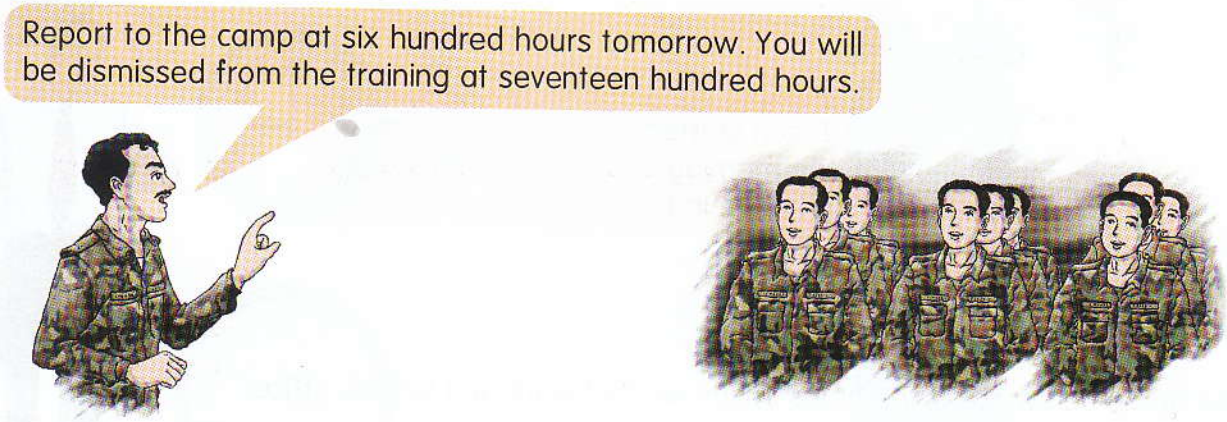
Eight thirty in the morning can be written as 8.30 a.m.
Six fifty-five in the evening can be written as 6.55 p.m.

We use the words a.m. and p.m. to refer to time that is before noon and after noon. This way of writing down the time uses the 12-hour clock. The figure below shows the 12-hour clock.

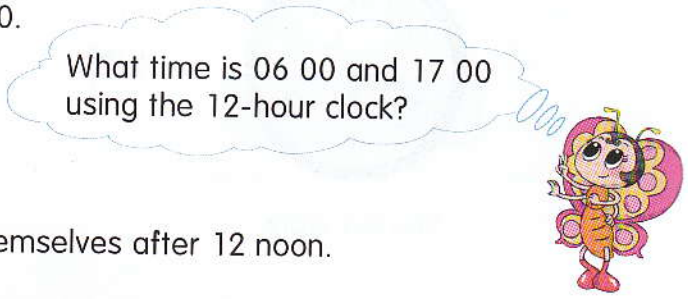
12-hour clock



There is also another way of telling time. We can use the 24-hour clock instead. Look at the example below.

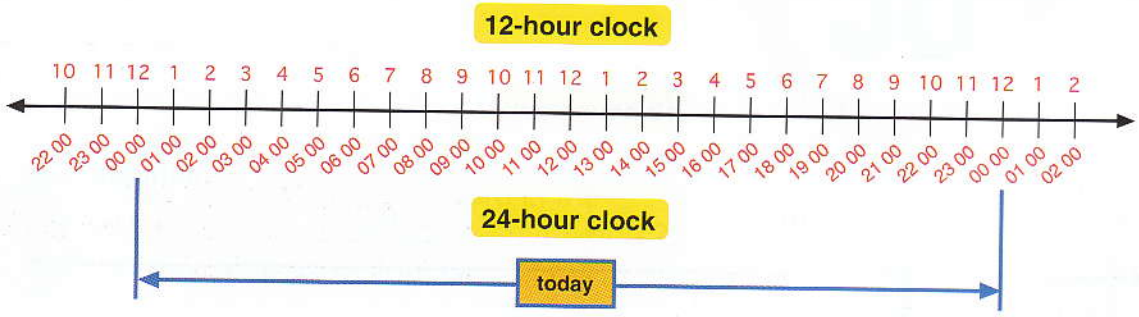


Six hundred hours is written as 06 00.
Seventeen hundred hours is written as 17 00.



In the 12-hour clock, the numbers repeat themselves after 12 noon.
We only need to change the a.m. to p.m.

In the 24-hour clock, the words a.m. and p.m. are not used. We use a 4-digit number to write the time. 12.00 p.m. or 12 noon is written as 12 00. 1.00 p.m. is written as 13 00, 2.00 p.m. is written as 14 00 and so on.



So,
06 00 is six o'clock in the morning or 6.00 a.m.
17 00 is five o'clock in the evening or 5.00 p.m.

THINK

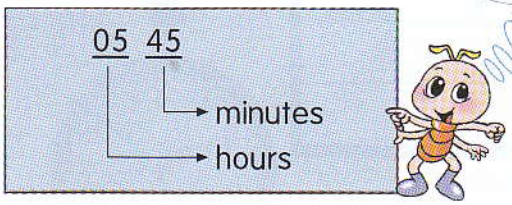
12 noon is represented by 12 00. Is 12 midnight represented by 00 00 or 24 00? Discuss why this is so.

The time shown below uses the 24-hour clock. What is the time in the 12-hour clock?

05 45 = ____

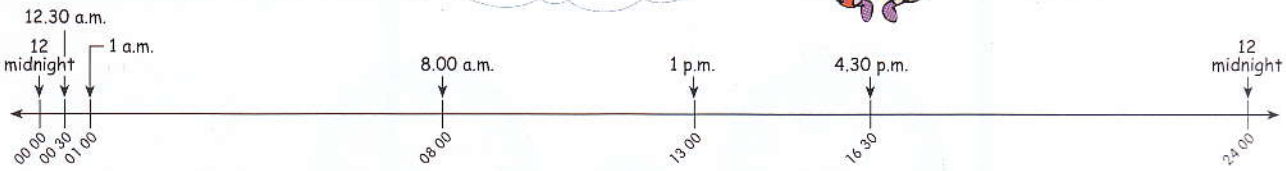
14 22 = ____

The first 2 digits represent the hours.
The last 2 digits represent the minutes.



We can convert the 12-hour clock to the 24-hour clock in the following way.

From 1 a.m. to 12.59 p.m.
Write the time as a 4-digit number without the a.m./p.m.



From 12 midnight to 12.59 a.m.
Subtract 12 hours from the 12-hour clock.
12.30 a.m. ⟷ 00 30

From 1 p.m. to 11.59 p.m.
Add 12 hours to the 12-hour clock.
4.30 p.m. ⟷ 16 30

1. Convert the following times from the 12-hour clock to the 24-hour clock.

12-hour clock	24-hour clock
7.27 p.m.	
8.45 a.m.	
12.55 p.m.	
5.28 p.m.	
12.40 a.m.	
9.00 p.m.	
10.01 p.m.	
7.04 a.m.	

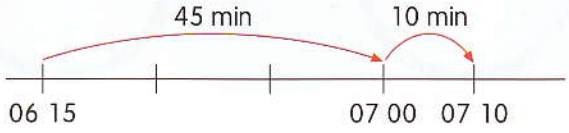
2. Convert the following times from the 24-hour clock to the 12-hour clock.

24-hour clock	12-hour clock
11 00	
21 39	
06 19	
00 22	
17 30	
14 25	
04 10	
15 15	

Workbook 6A Part 2
Chapter 5
Worksheet 1

B Duration of time

1. Mr Tan left his house to go for his morning walk at 06 15 and was back home at 07 10. How long was he out of his house?

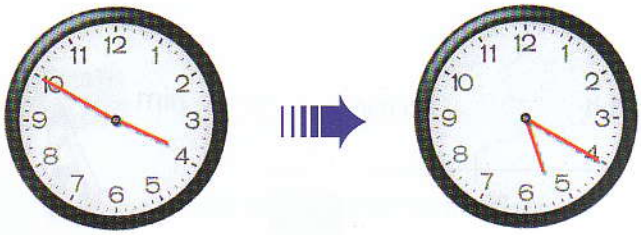


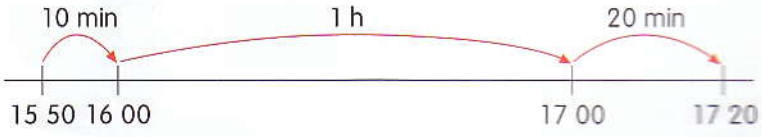
Count up to the nearest hour first.

45 min + 10 min = 55 min

He was out of his house for 55 minutes.

2. Siti took a train and a bus to get to her grandmother's place. If she boarded the train at 15 50 and reached her grandmother's place at 17 20, how long did the journey to her grandmother's place take?

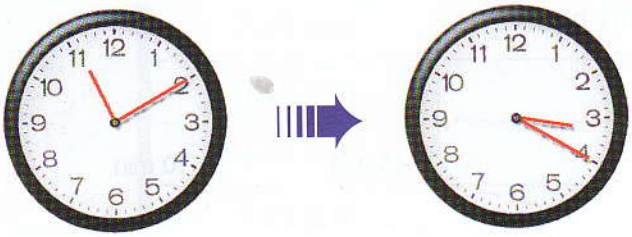


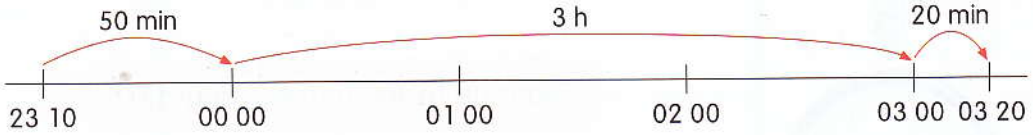


10 min + 1 h + 20 min = 1 h 30 min

The journey to her grandmother's place took 1 hour 30 minutes.

3. A New Year's Eve party started at 23 10 on 31st December and ended at 03 20 on 1st January. How long did the party last?





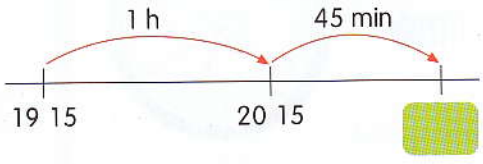
50 min + 3 h + 20 min = 3 h 70 min

= 4 h ____ min

60 min = 1 h

The party lasted 4 hours ____ minutes.

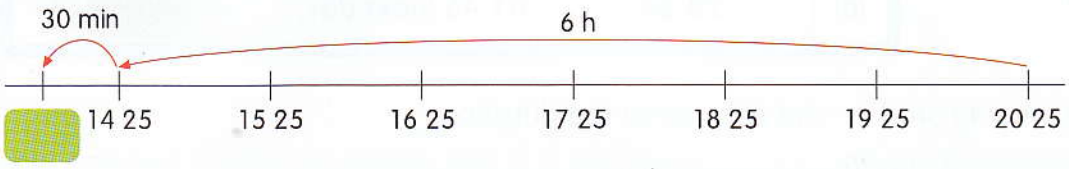
4. Linette attends a yoga class every Monday after work. The class lasts for 1 hour 45 minutes. If her class starts at 19 15, what time does it end?



Her yoga class ends at ____.

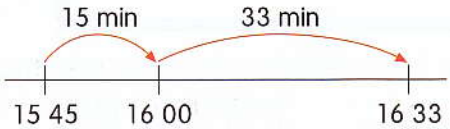
5. A train travelling from Singapore to Kuala Lumpur took 6 hours 30 minutes to reach its destination. If the train arrived at Kuala Lumpur at 20 25, what time did the train leave the station in Singapore? Give your answer using both the 12-hour and the 24-hour clocks.

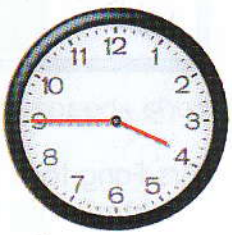
Count backwards by 6 h and 30 min.



The train left the station at _____ or _____.

6. Swee Lin and Fatima started doing their Mathematics homework at 15 45. Swee Lin finished her homework in 42 minutes. Fatima finished hers at 16 33. Who took longer to do the Mathematics homework? How much longer?





15 min + 33 min = _____ min

Fatima took _____ minutes to do her Mathematics homework.

_____ min – _____ min = _____ min

_____ took longer by _____ minutes.

1. Look at the start time and end time listed for each part below. Find the duration between these 2 times.

	Start time	End time	Duration
(a)	00 00	05 30	
(b)	09 10	15 20	
(c)	12 44	14 05	
(d)	23 55	01 45 (next day)	

2. Find the missing start or end time given the duration.

	Start time	End time	Duration
(a)	09 17		3 h 27 min
(b)		07 08	44 min
(c)	23 45		25 min
(d)		02 22	6 h 10 min

3. Mrs Fang took a taxi from her home to Greenville Shopping Mall. The start time and end time of the journey are shown in the receipt on the right. How long was her taxi journey?


ISLAND CAB

FEEDBACK HOTLINE
6214 2425
SH 64336

RECEIPT No. 2214
START 14/10/2005 14:57
END 14/10/2005 15:28
KM . RUN 15.7
FARE 10.10

TOTAL 10.10

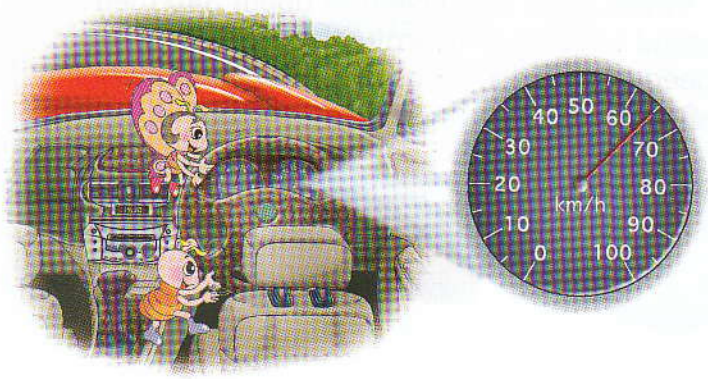
Have a nice journey!

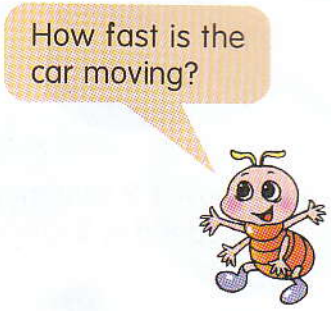
4. Raju left home at 20 10 and drove to his friend's house to pick up a parcel. If he took 5 minutes to get to his car and 18 minutes to drive to his friend's house, what time did he arrive at his friend's house?

5. A store opens for 9 h 30 min every day from Monday to Saturday. If it closes at 19 30 every day, what time does it open each morning?

Workbook 6A Part 2
Chapter 5
Worksheet 2

C Speed

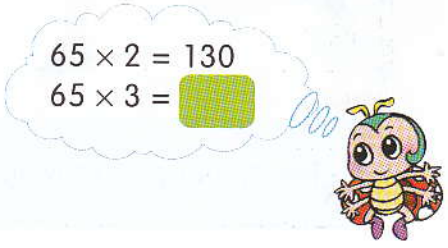




The speedometer on the car shows that it is moving at a speed of 65 kilometres per hour.

This means that the car is travelling 65 kilometres every hour.

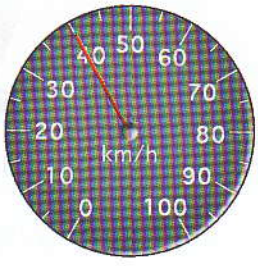
In 1 hour, the car travels 65 km.
In 2 hours, the car travels 130 km.
In 3 hours, the car travels _____ km.



We can write 65 kilometres per hour as 65 km/h.

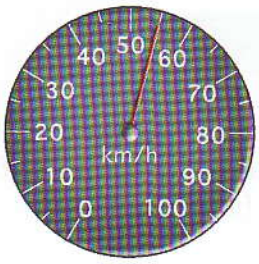
The following speedometers show the speeds of 3 cars. Read the different speeds shown below. Which car is travelling the fastest?

Car A



_____ km/h

Car B



_____ km/h

Car C

_____ km/h

Car _____ is travelling the fastest.

The examples below show some other common units for speed.

Sound travels in air at a speed of about 340 metres per second at room temperature.
The speed of sound in air at room temperature is about 340 m/s.

The snail moves 2 centimetres every second.
The snail's speed is 2 cm/s.

Ahmad ran 200 metres in a minute.
His running speed was 200 m/min.

The speed of a moving object is the rate of distance travelled per unit time.

1. A cyclist is cycling at a speed of 15 km/h. What distance can he travel in 3 hours?

   1 hour → 15 km

   3 hours → 15 × 3 = ____ km

   Distance = Speed × Time

   In 3 hours, the cyclist can travel ____ km.

2. During a walkathon, Sharon walked at a speed of 82 m/min for the first 10 minutes. How far did she walk during the first 10 minutes?

   Distance = Speed × Time

   = ____ × ____ = ____ m

   She walked a distance of ____ m during the first 10 minutes of the walkathon.

3. A midnight train left the railway station at 00 30 and arrived at its destination at 07 30. The distance covered by the train was 350 km. What was the speed of the train?

To find the speed in km/h, find the distance travelled per hour in kilometres.

7 hours later

7 hours → 350 km

1 hour → 350 ÷ 7 = ____ km

Speed = Distance ÷ Time

The speed of the train was ____ km/h.

4. A motorist travelled 151 km in 2 hours. At what speed did he travel?

Speed = Distance ÷ Time

= ____ ÷ ____ = ____ km/h

He travelled at a speed of ____ km/h.

5. A plane flew a distance of 14 400 km at a speed of 900 km/h. How long did the journey take?

900 km → 1 h

14 400 km → 14 400 ÷ 900 = ____ h

Time = Distance ÷ Speed

The journey took ____ h.

6. A toy car travelled a distance of 750 m at a speed of 250 m/min. How long did it take to cover the distance?

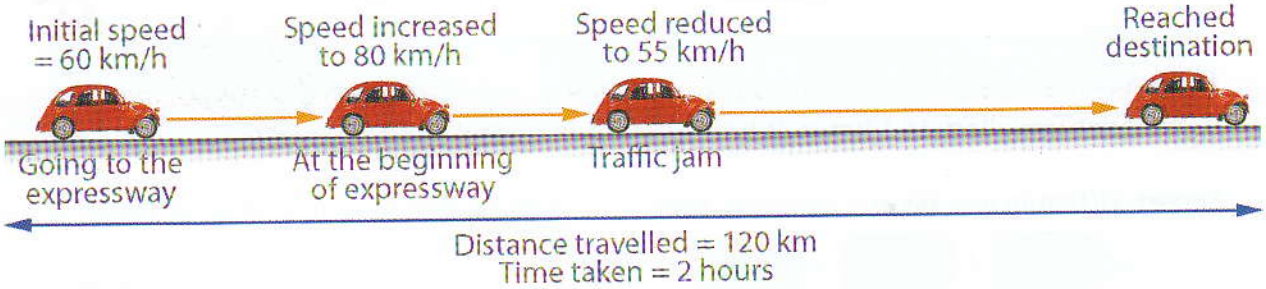
Time = Distance ÷ Speed

= ____ ÷ ____ = ____ min

The toy car took ____ minutes to cover the distance.

Average Speed

Look at the diagram below. The speed of the car is not always the same. As it travels, it increases or decreases its speed depending on the traffic conditions.



If we use the total distance travelled and the total time taken, we can find the average speed of the car.

Average speed = Total distance travelled ÷ Total time taken

Average speed = 120 ÷ 2
= 60 km/h

Speed = Distance ÷ Time

The car is travelling at an average speed of 60 km/h.

Try these.

1. Sean swam a distance of 108 m in 90 seconds. Find his average speed.

Average speed = ☐ ÷ ☐

= ☐ m/s

He swam at an average speed of ☐ m/s.

2. A car travelled at an average speed of 85 km/h for 3 hours. What was the distance it travelled?

Distance travelled = ☐ × ☐

= ☐ km

The distance travelled was ☐ km.

3. Fiona walked at an average speed of 80 m/min to get to her home. How long did she take to get home if she had to walk a total distance of 2 km?

Time taken = ☐ ÷ ☐

= ☐ min

She took ☐ minutes to get home.

2 km = 2000 m

1. Find the distance given the speed and time for each part below.

   (a) Speed = 90 km/h, Time = 13 h
   (b) Speed = 66 m/min, Time = 5 min
   (c) Speed = 19 cm/s, Time = 120 s
   (d) Speed = 4.5 km/h, Time = 3 h

2. Find the speed given the distance and time for each part below.

   (a) Distance = 320 km, Time = 4 h
   (b) Distance = 2322 cm, Time = 18 min
   (c) Distance = 8602 mm, Time = 11 s
   (d) Distance = 569 m, Time = 50 min

3. Find the time given the distance and speed for each part below.

   (a) Distance = 125 cm, Speed = 25 cm/min
   (b) Distance = 988 km, Speed = 76 km/h
   (c) Distance = 1760 cm, Speed = 88 cm/s
   (d) Distance = 207 mm, Speed = 23 mm/s

4. An ant crawls to an anthill and crawls back in 40 seconds. The anthill is 30 cm away from where it is. What is its average speed of travel?

5. Mrs Ong left the house at 09 50 and reached the market at 10 30. If she walked at an average speed of 55 m/min, how far was the market away from her house? Give your answer in kilometres.

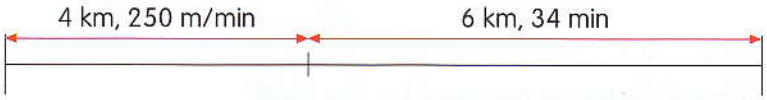
6. If a taxi travels a distance of 210 km at an average speed of 70 km/h, how long will the journey take?

7. A train departs from Station X to travel to Station Y at 12 10. The distance between the 2 stations is 560 km. If the train travels at a speed of 140 km/h, what time will the train arrive at Station Y?

Workbook 6A Part 2
Chapter 5
Worksheets 3 & 4

D More word problems

1. George jogged a distance of 4 km at 250 m/min and then walked another 6 km for 34 minutes. Find his average speed for the whole journey in m/min.



Total distance = 4 + 6 = 10 km

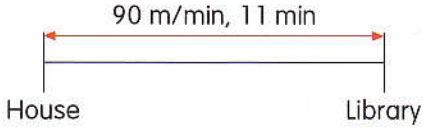
Time taken during the first 4 km = 4000 ÷ 250
= 16 min

Total time taken = 16 + 34 = 50 min

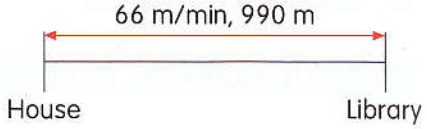
Average speed = 10 000 ÷ 50 = 200 m/min.

His average speed for the whole journey was 200 m/min.

2. Wendy walked to the library near her house at an average speed of 90 m/min. She reached the library in 11 minutes. How long would she take if she walked at an average speed of 66 m/min instead?



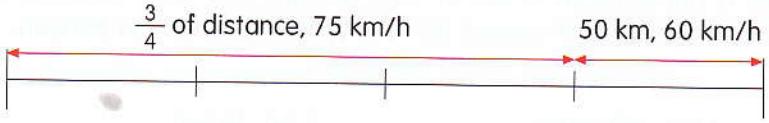
Distance from her house to library = 90 × 11
= 990 m



Time taken = 990 ÷ 66
= 15 min

She would take 15 minutes instead if she walked at an average speed of 66 m/min.

3. A car travelled $\frac{3}{4}$ of the journey at a speed of 75 km/h and finished the remaining 50 km at a speed of 60 km/h.



(a) What was the total distance covered by the car?

$\frac{1}{4}$ of the journey → 50 km

Whole journey → $50 \times 4 = 200$ km

The total distance covered by the car was 200 km.

(b) How long did the car take to complete the journey?

$\frac{3}{4}$ of the journey $= \frac{3}{4} \times 200$ km

$= 150$ km

For the first $\frac{3}{4}$ of the journey,

Time taken $= 150 \div 75$

$= 2$ h

1 h → 60 min

$\frac{5}{6}$ h → $\frac{5}{6} \times 60$

$= 50$ min

For the last 50 km,

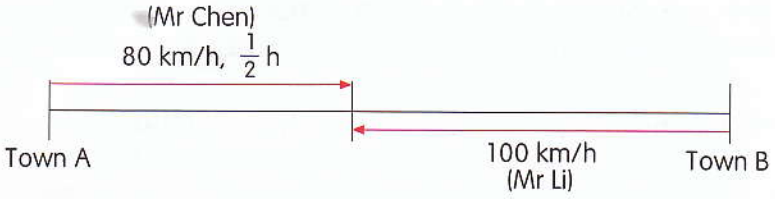
Time taken $= 50 \div 60$

$= \frac{5}{6}$ h $= 50$ min

Total time taken = 2 h + 50 min = 2 h 50 min

The car took 2 hours 50 minutes to complete the whole journey.

4. Mr Chen drove from Town A to Town B at a speed of 80 km/h. Mr Li drove from Town B to Town A at a speed of 100 km/h but he started 15 minutes later than Mr Chen. After driving for $\frac{1}{2}$ hour, Mr Chen met Mr Li on the road. What was the distance between Town A and Town B?



Distance travelled by Mr Chen $= 80 \times \frac{1}{2}$

$=$ ____ km

15 min $= \frac{15}{60}$ h

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

Mr Li's travelling time $= \frac{1}{2} - \frac{1}{4}$

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

Distance travelled by Mr Li $= 100 \times \frac{1}{4}$

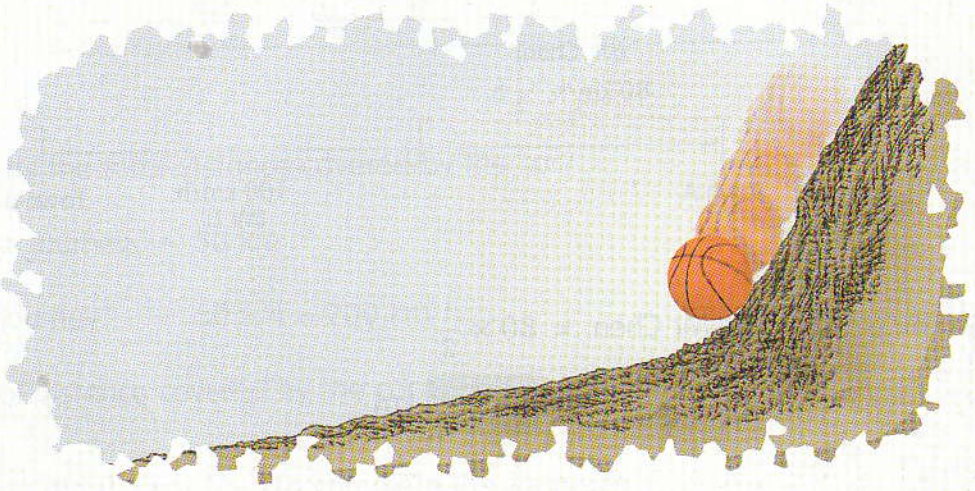
$=$ ____ km

Total distance between Town A and Town B $=$ ____ $+$ ____

$=$ ____ km

The distance between Town A and Town B was ____ km.

1. A ball rolled down a steeper part of a hill for 2 minutes at an average speed of 1.5 km/min. It then came to a gentler part of the hill and continued rolling down the rest of the way at an average speed of 0.9 km/min for 5 minutes. What was the total distance it rolled?



2. A coach travelled from Townsville to Springdale Town in 6 hours at an average speed of 70 km/h. For the last $\frac{2}{5}$ of the journey, the coach travelled at a speed of 84 km/h. What was the speed of the coach for the first $\frac{3}{5}$ of the journey?

3. Ahmad ran the first part of a race in 17 seconds and the remaining $\frac{1}{3}$ of the race at a speed of 6.8 m/s in 10 seconds.
   (a) What was the total distance Ahmad ran?
   (b) At what speed did Ahmad run during the first part of the race?

4. At 16 30, Mike boarded a bus which travelled a distance of 16 km at a speed of 48 km/h. He then alighted from the bus and started walking to his home, a distance of 1 km, at a speed of 100 m/min. What time did he reach home?

5. Gene completed $\frac{1}{5}$ of a journey in 10 minutes while John took 16 minutes to complete $\frac{1}{3}$ of the same journey. The distance of the whole journey was 4800 m.
   (a) Find Gene's speed.
   (b) Find John's speed.
   (c) Who was faster?

Workbook 6A Part 2
Chapter 5
Worksheet 5

Materials needed:

- A wooden plank about 1 metre long (or any hard surface of similar length)
- Books for lifting up one end of the plank
- 3 objects of different masses (e.g. toy car, coin and book)
- 3 different surfaces (e.g. silk cloth, white paper and sandpaper)
- Tape
- Stopwatch
- Record sheet (see below)

1. Make a slightly elevated slope with the wooden plank and some books as shown in the diagram on the right.

2. Tape some white paper onto the surface of the plank.

3. Take one of the objects and let it roll down from the top edge of the plank. Keep the time using the stopwatch. Start the stopwatch as soon as the object is released at the top edge and stop it as soon as it reaches the bottom. (Choose a person with a very fast response time to do this.)

4. Make a record sheet like the one shown below. Enter the time in the record sheet and then calculate the speed for each row.

5. Repeat the above process for each object with different types of surfaces. How do
   (a) the different types of surface materials and
   (b) the masses of objects
   affect the speed?

Distance = 1 m

Object	Surface material	Time taken (s)	Speed (m/s)
Toy car	White paper		
	Sandpaper		
	Silk cloth		
Coin	White paper		

Record sheet

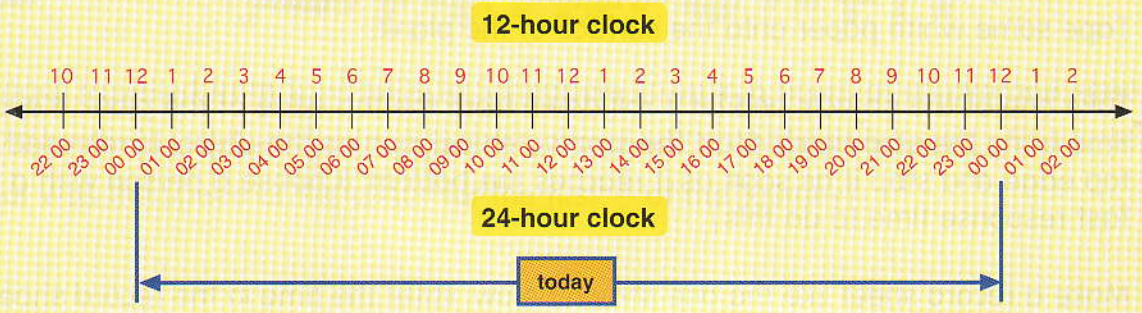
Workbook 6A Part 2
Chapter 5
Skill Practice 5

Wrap-Up!

✓ In the 24-hour clock, the words a.m. and p.m. are not used. We use a 4-digit number to write the time. The first 2 digits represent the hours (00 to 23). The last 2 digits represent the minutes (00 to 59).

Example: 05 45
- 45 → minutes
- 05 → hours

✓ We can easily convert the 12-hour clock to the 24-hour clock and vice versa using the diagram shown below.



✓ Speed is the rate of distance travelled per unit time. Some units for speed are km/h, m/min, cm/s and m/s.

✓ For speed, distance and time, given any two quantities, we can find the third quantity.
Distance = Speed × Time
Speed = Distance ÷ Time
Time = Distance ÷ Speed

✓ Average speed = Total distance travelled ÷ Total time taken

Review C

1. Arrange the following in ascending order.

$$2.4,\ \frac{7}{4},\ \frac{36}{10}$$

2. (a) Express 500 ml as a percentage of 2 l.
   (b) Express 84 cm as a percentage of 2.5 m.
   (c) Express 860 g as a percentage of 4 kg.

3. The sides of a triangle are in the ratio 3 : 5 : 4. What fraction of the perimeter is the shortest side?

4. If 4 : 7 = ▪ : 28, then ▪ represents ▪.

5. If $x = 8$, evaluate the following algebraic expressions.
   (a) $6x - 7$
   (b) $\frac{1 + 3x}{75}$
   (c) $\frac{42 - x}{2}$

6. Convert the following measurements.
   (a) 6.78 l = ▪ ml
   (b) $1\frac{3}{8}$ kg = ▪ g
   (c) 9630 cm = ▪ m
   (d) $5\frac{1}{3}$ h = ▪ min

7. John cycled from East Coast Park towards Tuas at an average speed of 12 km/h. What was the distance he covered if he cycled for 3 hours?

8. It took Wendy 4 hours to drive from Town A to Town B at an average speed of 60 km/h. On her return trip, she drove 20 km/h faster. How long did she take to return to Town A?

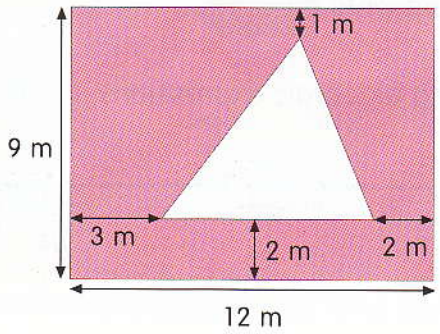
9. How many hours and minutes are there from 09 30 today to 01 15 tomorrow?

10. Mary and John each travelled a distance of 4500 m. Mary took 40 minutes to cover the distance while John took only 30 minutes. What was the difference in speed travelled by Mary and John?

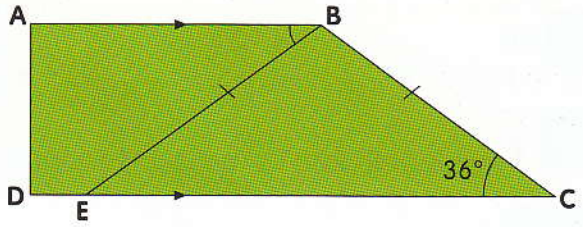
11. The ratio of the volume of Cube A to the volume of Cube B is 7: 6. The ratio of the volume of Cube B to the volume of Cube C is 2 : 1. Find the ratio of the volume of Cube A to the volume of Cube B to the volume of Cube C.

12. There are 540 buttons in a box. $\frac{1}{3}$ of them are red. $\frac{2}{5}$ of the remainder are black and the rest are white. The white buttons are shared equally among 3 girls. How many white buttons does each girl have?

13. Find the shaded area in the following figure.



14. ABCD is a trapezium. AB//DC, $\angle BCD = 36°$ and BC = BE. Find $\angle ABE$.

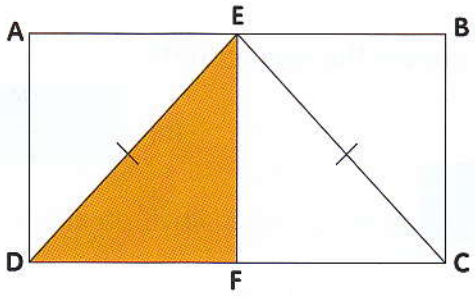


15. What is 8.16 p.m. in the 24-hour clock?

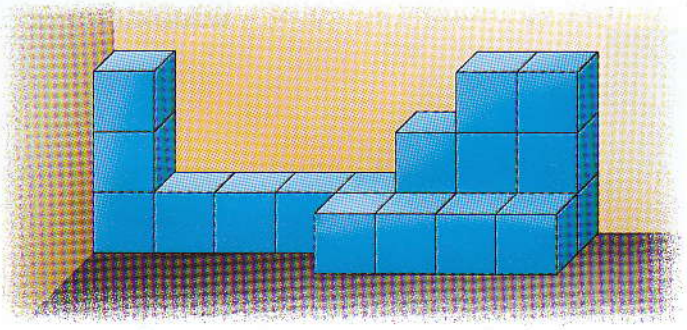
16. The number of boys is $\frac{7}{2}$ of the number of girls among the spectators at a football match. What is the ratio of the number of girls to the number of boys watching the match?

17. For every 3 km that Mr Tan walked, Mr Ho walked a distance of 1.2 km. If they both started at the same time from the same place but in the opposite direction, how far apart were they at the point when Mr Tan completed 15 km?

18. ABCD is a rectangle and DEC is an isosceles triangle. AE = EB. What percentage of the rectangle is shaded?



19. The following solid figure is made up of 1-cm cubes. What is its volume?

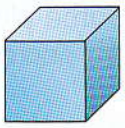


20. Raju and Kumar received $600 in the ratio 2 : 3. When Kumar gave Raju some of his money, the ratio became 2 : 1. How much money did Kumar give to Raju?

21. A tour bus left the terminal at 19 40. The bus travelled at an average speed of 90 km/h and took 5 hours to reach its destination.

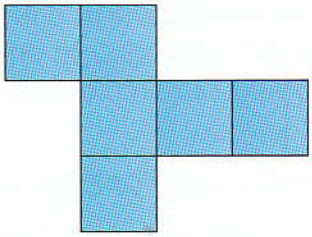
    (a) At what time did the bus reach its destination? (Give your answer using the 24-hour clock.)
    (b) What distance did the bus travel?

22. This is a cube.

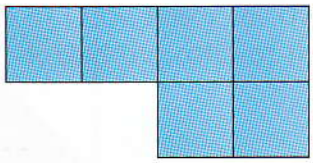


Which of the following shows the correct net?

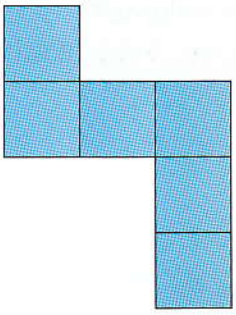
(a)



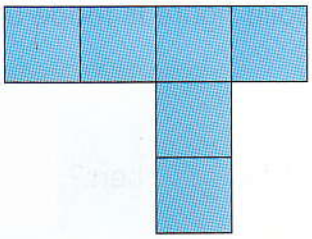
(b)



(c)



(d)



Review D

1. Write 790 265 in words.

2. $\frac{2}{5} \div 3 =$ ____

3. Which of the following fractions is equivalent to 12 sevenths?

   (a) $1\frac{1}{7}$ (b) $1\frac{2}{7}$

   (c) $12\frac{1}{7}$ (d) $1\frac{5}{7}$

4. A square has a length of 15 cm. If the length is reduced by 20%, find the area of the reduced square.

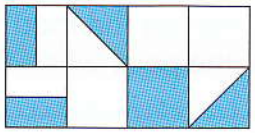
5. What are the missing numbers?

   20 : 15 : 10 = ____ : 3 : ____

6. Express $\frac{5}{8}$ as a percentage.

7. Find the value of 56.73 – 2.15 + 3.67. Round off your answer to 1 decimal place.

8. What percentage of the rectangle is shaded?



9. Arrange the following numbers in ascending order.

   0.404, 0.44, 0.044, 0.4, 0.04

10. When the result of 412 × 26 is rounded off to the nearest hundred, what is the answer?

11. Mary puts 40% of her monthly salary in savings. She gives 16% of her savings to her 4 brothers such that each person receives $36. How much is her monthly salary?

12. What is the value which is exactly half way between 7.34 and 15.8?

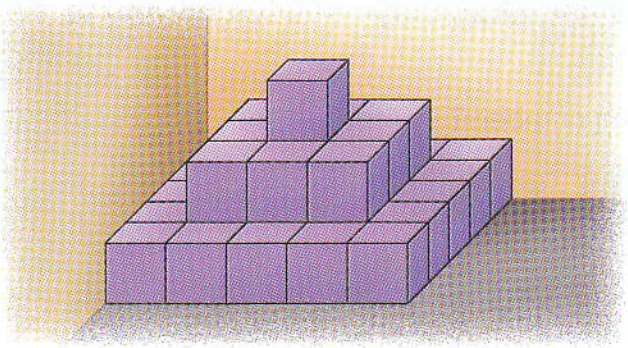
13. A car consumes 2 l of petrol for every 37 km it travels. How much petrol will the car consume if it travels a distance of 222 km?

14. Which of the following expressions gives the largest value?

    (a) $(24 + 6) \div (2 \times 3)$
    (b) $(24 + 6) \div 2 \times 3$
    (c) $24 + 6 \div (2 \times 3)$
    (d) $24 + 6 \div 2 \times 3$

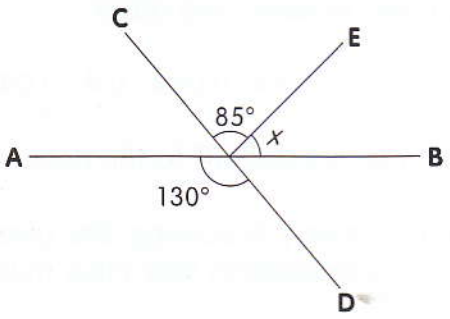
15. Sally brought home $\frac{2}{3}$ of a pizza from a party. She then ate $\frac{2}{5}$ of the pizza that she brought home. What fraction of the whole pizza was she left with?

16. The following solid figure is made up of identical cubes. How many cubes are required to build the figure?



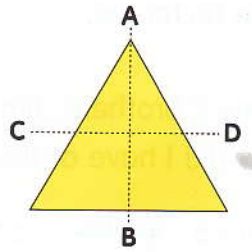
17. Judy walked from home to a nearby market at a speed of 30 m/min. Her sister Rose, started walking home from the market at the same time at a speed of 40 m/min in the opposite direction. The distance between their home and the market was 350 m.
    (a) How long did it take before they met on the road?
    (b) How far was Rose from home at the point when they met?

18. AB and CD are straight lines. Find $\angle x$.

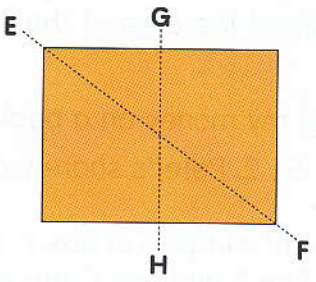


19. Identify the correct line of symmetry for each of the following figures.

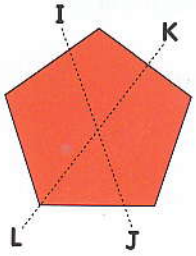
(a)



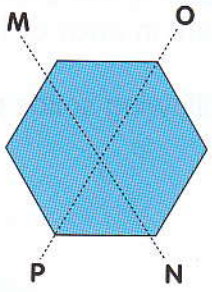
(b)



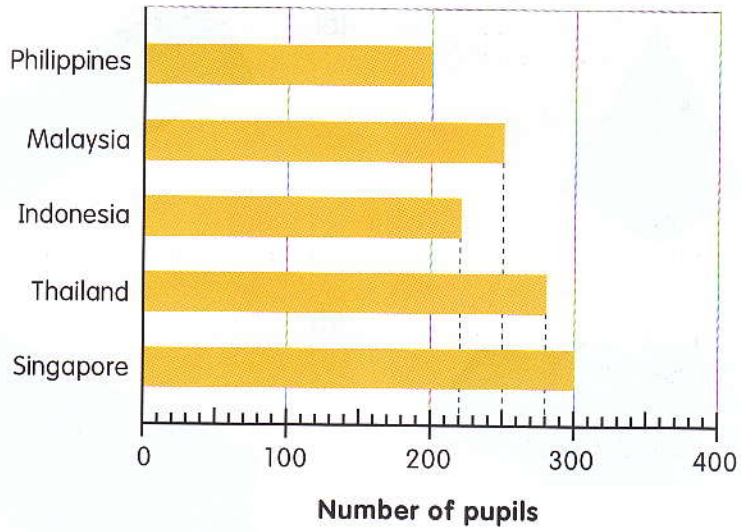
(c)



(d)



20. Pupils from 5 Asean countries came together to attend an Asean festival. The number of pupils from the 5 countries are shown in the bar graph below.



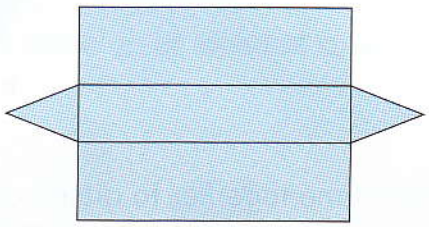
(a) What was the total number of pupils from Philippines and Indonesia?
(b) What fraction of the pupils came from Singapore?
(c) What percentage of the total number of pupils came from Malaysia?

21. String A is 16 cm long. String B is 20 cm long. String A is made into a square while String B is made into a rectangle of which the length and breadth are in the ratio 4 : 1. Find the ratio of the area of the square to the area of the rectangle.

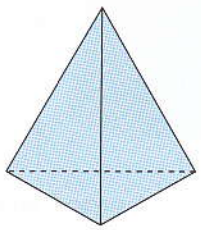
22. I spent $\frac{1}{4}$ of my money on a book and gave the rest to my 2 brothers, Jim and Peter, in the ratio 5 : 2. Peter's share was $6. How much money did I have at the beginning?

23. The number of marbles in Box A and Box B are in the ratio 5 : 4 while the number of marbles in Box B and Box C are in the ratio 2 : 3. When 14 marbles are transferred from Box C to Box A, the 2 boxes have the same number of marbles. How many marbles are there in each of the Boxes A, B and C, at the beginning?

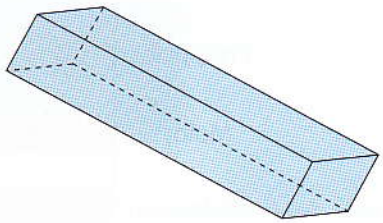
24. Which of the following solids can be formed by the given net?



(a)

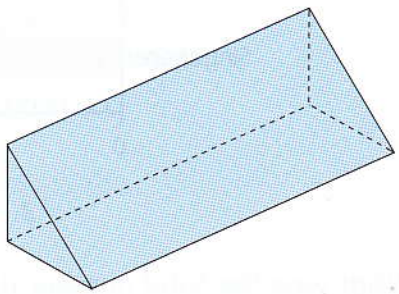


(b)



(c)

(d)



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