New Syllabus

Primary Mathematics

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5B

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PREFACE

The New Syllabus Primary Mathematics (NSPM) series is designed and written based on the latest primary mathematics syllabus. In this series, the concrete to abstract approach is adopted to introduce new concepts. Vivid and stimulating illustrations are used throughout the series to enhance learning. The knowledge base is built incrementally as the pupils progress up the levels so as to consolidate the linkages among mathematical concepts.

The series aims to meet the learning needs of pupils from Primary One to Six. It comprises textbooks and workbooks at each level. Every worksheet in the workbook corresponds to each concept learnt. Textbook 5B comprises 6 chapters. Each chapter comprises the following sections:

Do You Know? Relevant, thought-provoking questions are asked with regard to the real life situation presented at the beginning of each chapter to link Mathematics to daily life.

Let's Learn New concepts are explained in a straight-forward and interesting way. Creative and critical thinking, as well as an awareness of problem-solving strategies, are developed through worked examples in this section. Guided examples provide reinforcement and consolidation of the concepts taught.

Let's Explore Active participation in exploration of the concepts learnt and creative application of Mathematics to daily life, including IT and hands-on activities, help to develop lifelong learners. Social skills such as effective communication, cooperation and team spirit are encouraged through group and pair work.

Let's Think Opportunities are provided to develop higher order thinking skills and proficiency in applying the concepts learnt through non-routine and challenging questions.

Let's Try Exercises are provided for pupils to develop their problem-solving skills, so that pupils grow into confident and independent learners.

Fun with Maths Mathematical concepts are extended beyond the boundaries of the classroom and taken into the realm of games and experiments to further engage and develop pupils' interest in Mathematics.

CONTENTS

12. Triangles

13. 4-sided Figures

8 Decimals

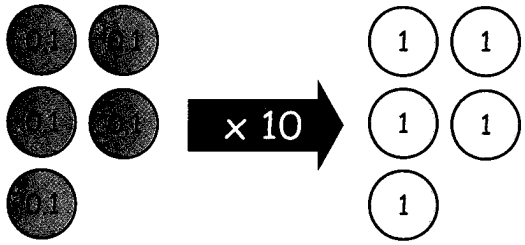
DO YOU KNOW?

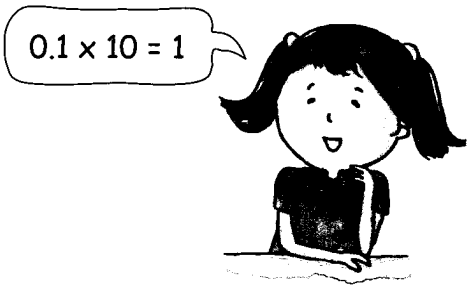
Do you know how much Sumei's mother spent on her groceries?

Let's Learn .•. Multiplication

Multiply by ten

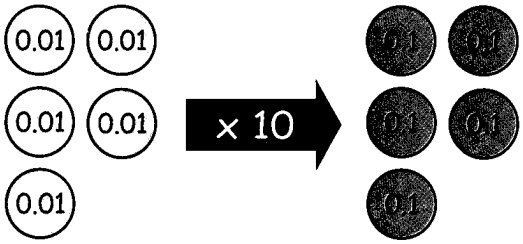
1. 0.5 x 10

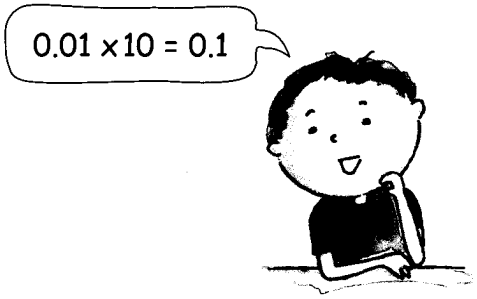




0.5 x 10 = 5

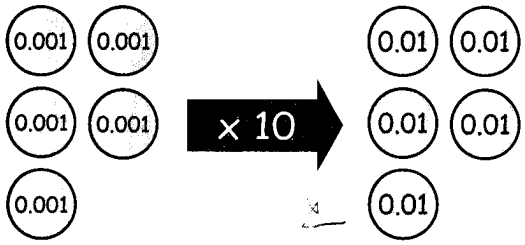
2. 0.05 x 10

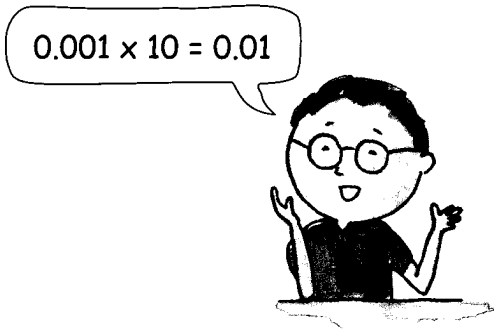




0.05 x 10 = 0.5

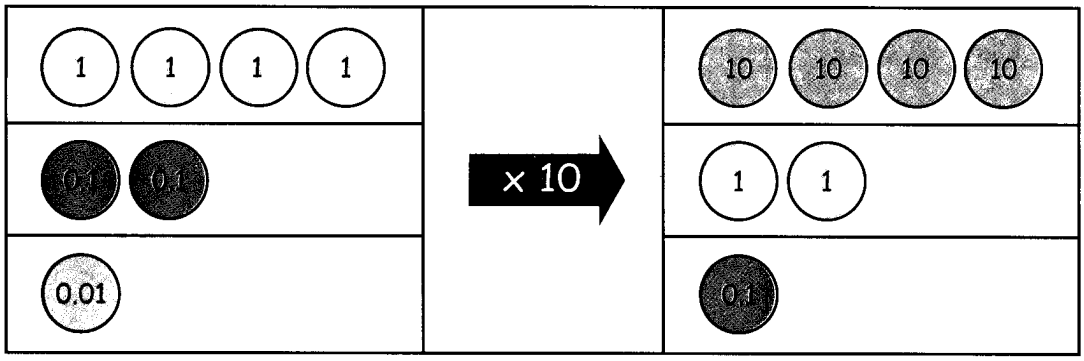
3. 0.005 x 10



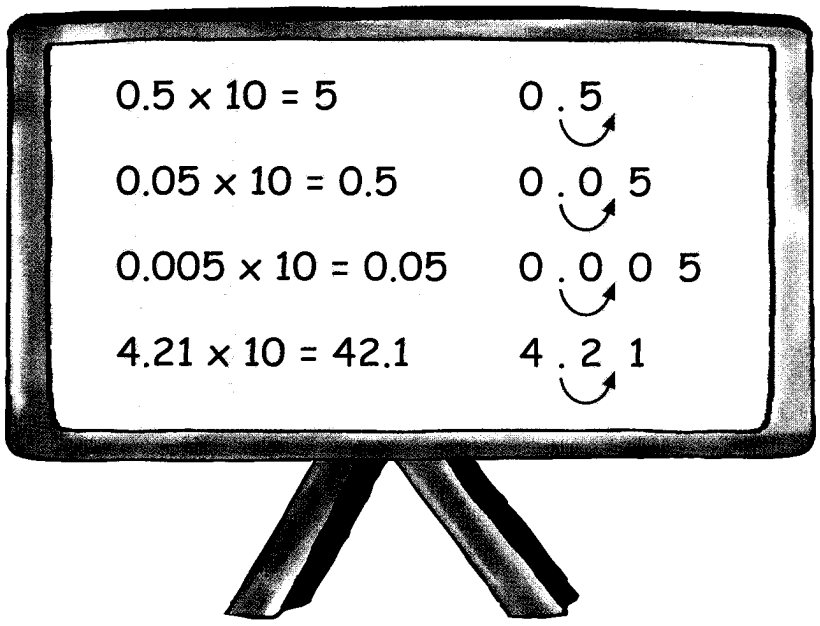


0.005 x 10 = 0.05

4. 4.21 x 10



4.21 x 10 = 42.1



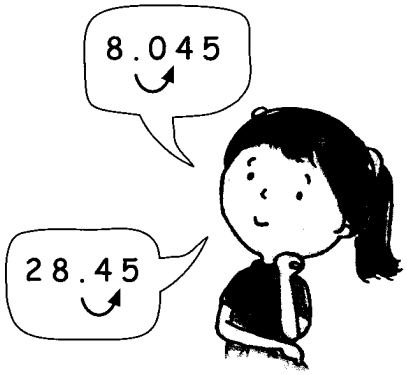
When a decimal is multiplied by 10, we may think of it as moving the decimal point 1 place to the right.

5. Multiply 8.045 by 10.

8.045 x 10 = 80.45

6. Multiply 28.45 by 10.

28.45 x 10 = ☐



Multiply by hundred

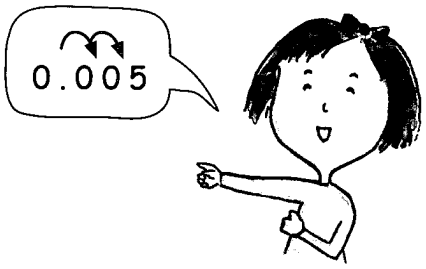
7. 0.005 x 100

$0.005 \times 100 \leftarrow 10 \times 10$

$= 0.005 \times 10 \times 10$

$= 0.05 \times 10$

$= 0.5$



$0.005 \times 100 = 0.5$

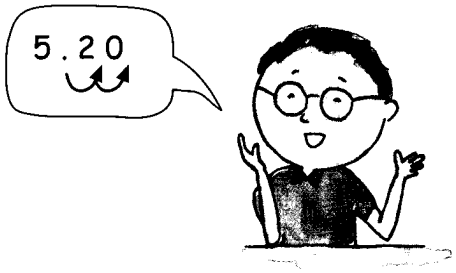
8. 5.2 x 100

5.2×100

$= 5.2 \times 10 \times 10$

$= 52 \times 10$

$= 520$

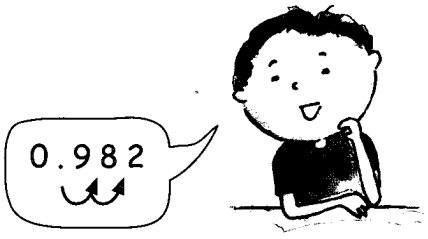


$5.2 \times 100 = 520$

When a decimal is multiplied by 100, we may think of it as moving the decimal point 2 places to the right.

9. Multiply 0.982 by 100.

$0.982 \times 100 =$ ☐



Multiply by thousand

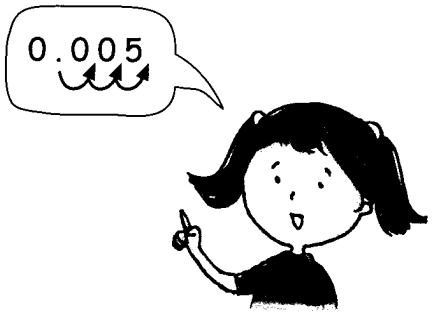
10. 0.005 x 1000

0.005×1000 ← 100 x 10

$= \underbrace{0.005 \times 100}_{0.5} \times 10$

$= 0.5 \times 10$

$= 5$



$0.005 \times 1000 = 5$

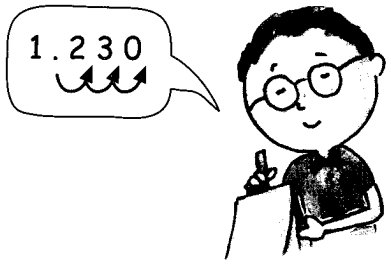
11. 1.23 x 1000

1.23×1000

$= \underbrace{1.23 \times 100}_{123} \times 10$

$= 123 \times 10$

$= 1230$

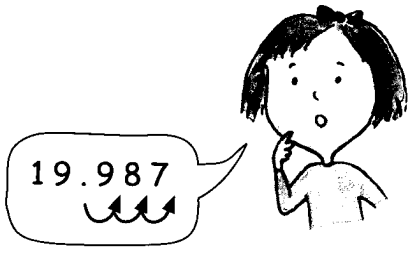


$1.23 \times 1000 = 1230$

When a decimal is multiplied by 1000, we may think of it as moving the decimal point 3 places to the right.

12. Multiply 19.897 by 1000.

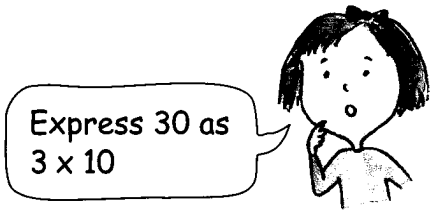
$19.897 \times 1000 =$ ☐

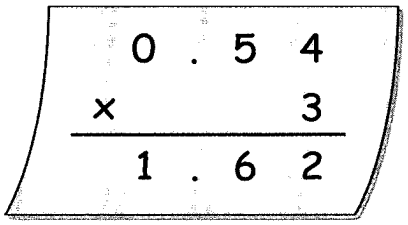


Multiply by multiples of ten

10. 0.54 x 30

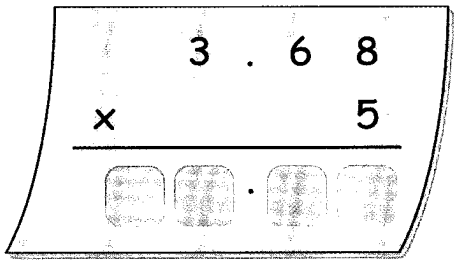
$$0.54 \times 30 = \underbrace{0.54 \times 3}_{} \times 10$$
$$= 1.62 \times 10$$
$$= 16.2$$





11. 3.68 x 50

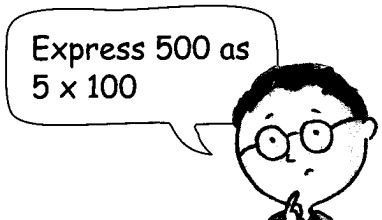
$$3.68 \times 50 = \underbrace{3.68 \times \boxed{5}}_{} \times 10$$
$$= \quad \times 10$$
$$= \quad$$

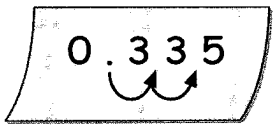


Multiply by multiples of hundred

12. 0.067 x 500

$$0.067 \times 500 = \underbrace{0.067 \times 5}_{} \times 100$$
$$= 0.335 \times 100$$
$$= 33.5$$





13. Multiply 0.528 by 800.

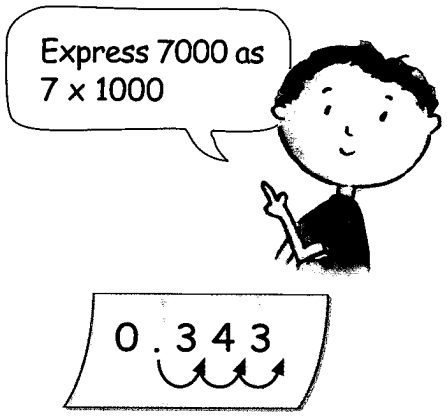
$0.528 \times 800 = 0.528 \times \square \times 100$

$= \square \times 100$

$= \square$

Multiply by multiples of thousand

14. 0.049×7000



$0.049 \times 7000 = \underbrace{0.049 \times 7} \times 1000$

$= 0.343 \times 1000$

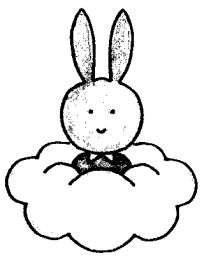
$= 343$

15. Multiply 4.72 by 4000.

$4.72 \times 4000 = 4.72 \times \square \times 1000$

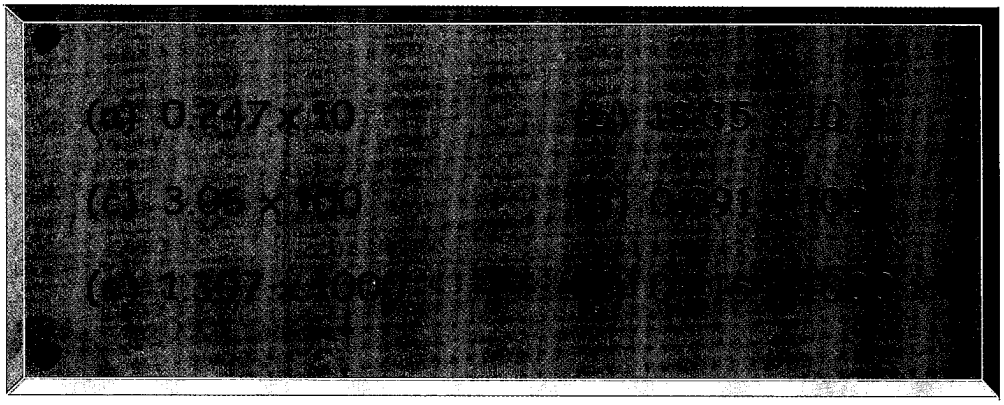
$= \square \times 1000$

$= \square$



Let's Try .. Multiplication

1. Multiply.



2. Multiply.

(a) 16.07 x 20

(b) 0.542 x 60

(c) 1.287 x 300

(d) 13.19 x 500

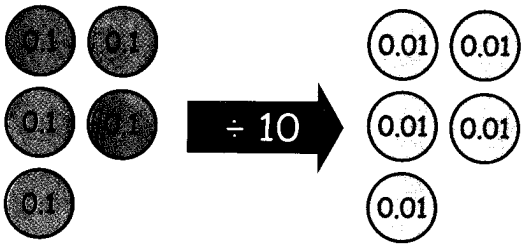
(e) 0.023 x 4000

(f) 3.197 x 7000

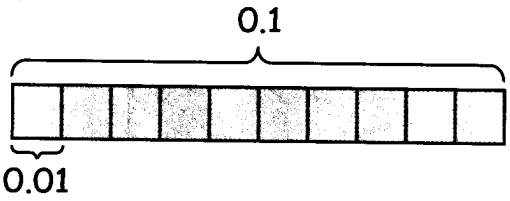
Let's Learn .. Division

Divide by ten

1. 0.5 ÷ 10



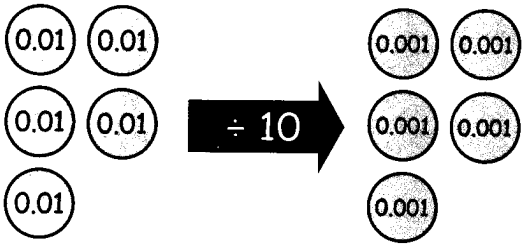
Divide by 0.1 into 10 equal parts



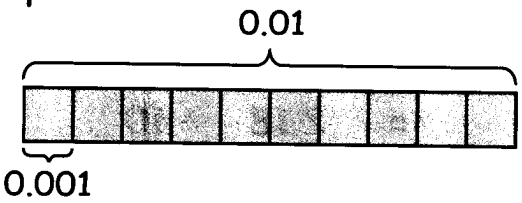
1 part is 0.01.
0.1 ÷10 = 0.01

0.5 ÷ 10 = 0.05

2. 0.05 ÷ 10



Divide 0.01 into 10 equal parts



1 part is 0.001.
0.01 ÷ 10 = 0.001

0.05 ÷ 10 = 0.005

0.5 ÷ 10 = 0.05 0 . 5

0.05 ÷ 10 = 0.005 0 . 0 5

When a decimal is divided by 10, we may think of it as moving the decimal point 1 place to the left.

Divide by hundred

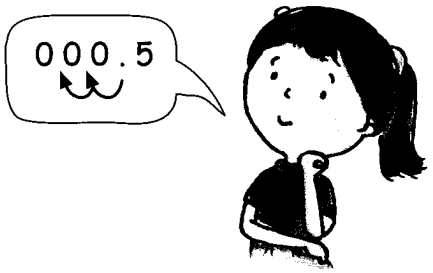
3. $0.5 \div 100$

$0.5 \div 100$ ← 10 x 10

$= \underbrace{0.5 \div 10} \div 10$

$= 0.05 \div 10$

$= 0.005$



$0.5 \div 100 = 0.005$

4. $21.8 \div 100$

$21.8 \div 100$

$= \underbrace{21.8 \div 10} \div 10$

$= 2.18 \div 10$

$= 0.128$

$21.8 \div 100 = 0.218$

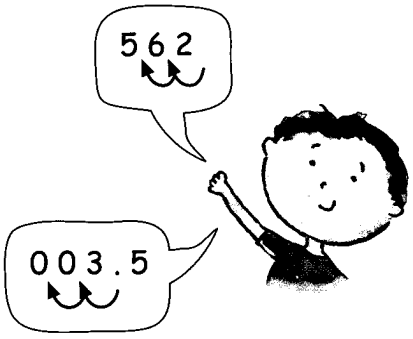
When a number is divided by 100, we may think of it as moving the decimal point 2 places to the left.

5. Divide $562 \div 100$

$562 \div 100 = 5.62$

6. Divide 3.5 by 100.

$3.5 \div 100 =$ ☐



Divide by thousand

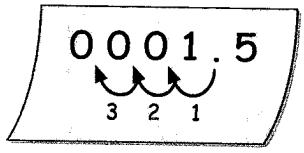
7. 1.5 ÷ 1000

1.5 ÷ 1000 ← 100 ×10

= 1.5 ÷ 100 ÷ 10

= 0.015 ÷ 10

= 0.0015

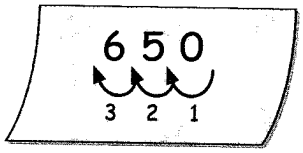


1.5 ÷ 1000 = 0.0015

When a number is divided by 1000, we may think of it as moving the decimal point 3 places to the left.

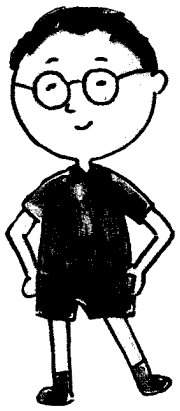
8. Divide 650 by 1000

650 ÷ 1000 = 0.65



9. Divide 7.1 by 1000.

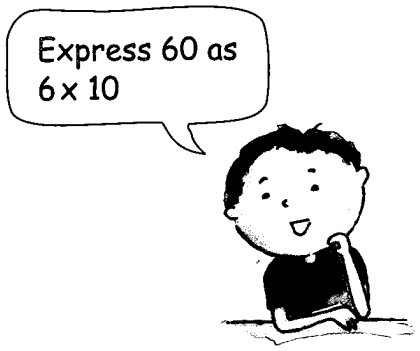
7.1 ÷ 1000 = ☐



Divide by multiples of ten

10. $0.54 \div 60$

$$0.54 \div 60 = \underbrace{0.54 \div 6}_{} \div 10$$
$$= 0.09 \div 10$$
$$= 0.009$$



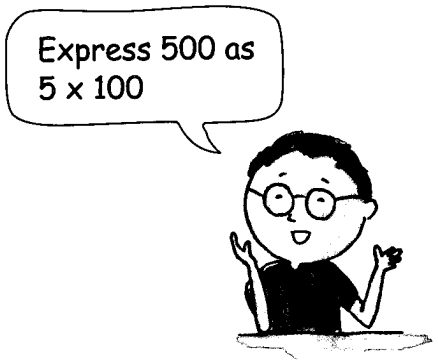
11. $3.24 \div 40$

$$3.24 \div 40 = \underbrace{3.24 \div 4}_{} \div 10$$
$$= \square \div 10$$
$$= \square$$

Divide by multiples of hundred

12. $6.5 \div 500$

$$6.5 \div 500 = \underbrace{6.5 \div 5}_{} \div 100$$
$$= 1.3 \div 100$$
$$= 0.013$$



13. $43.4 \div 700$

$$43.4 \div 700 = \underbrace{43.4 \div 7}_{} \div 100$$
$$= \square \div 100$$
$$= \square$$

Multiply by multiples of thousand

14. $12.6 \div 2000$

$$12.6 \div 2000 = \underbrace{12.6 \div 2} \div 1000$$
$$= 6.3 \div 1000$$
$$= 0.0063$$

15. $318 \div 4000$

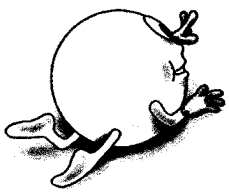
$$318 \div 4000 = \underbrace{318 \div 4} \div 1000$$
$$= \square \div 1000$$
$$= \square$$

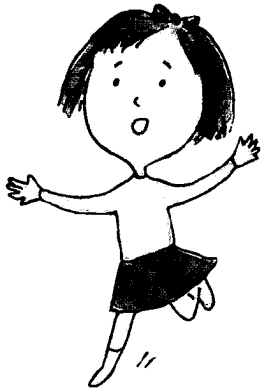
4 numbers are fed into each number machine as shown below.

Copy the table, then fill in the numbers that will be discharged at the output.

Use a calculator to check your answers.

Input numbers	Number machine	Output numbers
0.6 (0.03) 4.5 (15.8)	× 20	○ ○ ○ ●
(34.5) 14.4 (80.1) 645	÷ 30	● ○ ● ○
(0.26) 0.05 (2.16) 0.7	× 400	● ○ ● ○
(240) 84 60 36	÷ 600	● ○ ○ ○





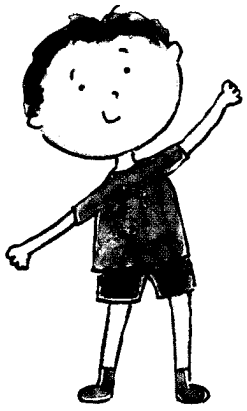
Let's Try .. Division

1. Divide.

(a) $30 \div 10$	(b) $429.6 \div 10$	(c) $80.23 \div 100$
(d) $10 \div 100$	(e) $9900 \div 1000$	(f) $7.216 \div 1000$

2. Divide.

(a) $1.64 \div 20$	(b) $5.58 \div 40$
(c) $142.5 \div 300$	(d) $966.3 \div 600$
(e) $23 \div 4000$	(f) $651.5 \div 5000$



Let's Learn ... Conversion of Measurements Involving Decimals

Length

1. The length of Jane's desk is 0.85 m.
   Express this length in cm.

   0.85 m = 0.85 x 100 cm
   = 85 cm

   1 m = 100 cm

2. Express 325 cm in m.

   325 cm = 325 ÷ 100 m
   = 3.25 m

3. Express 3.725 m in cm.

   3.725 m = 3.725 x ☐ m
   = ☐ cm

4. Express 650 cm in m.

   650 cm = 650 ÷ ☐ m
   = ☐ m

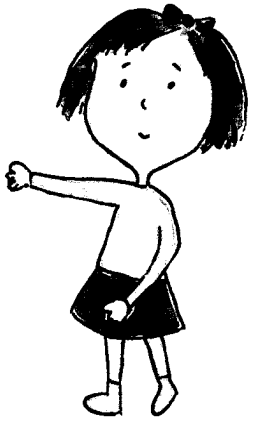
5. Express 3.538 km in m.

   3.538 km = 3.538 x 1000 m
   = 3538 m

   1 km = 1000 m

6. Express 4750 m in km.

$4750\ m = 4750 \div 1000\ km$
$= 4.75\ km$



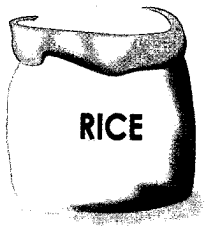
7. Express 1.35 km in m.

$1.35\ km = 1.35 \times \square\ m$
$= \square\ m$

8. Express 2510 m in km.

$2510\ m = 2510 \div \square\ km$
$= \square\ km$

Mass



9. A bag of rice has a mass of 10.52 kg. Express this mass in g.

$10.52\ kg = 10.52 \times 1000\ g$
$= 10\ 520\ g$

1 kg = 1000 g

10. Express 3051 g in kg.

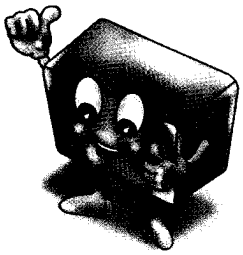
$3051\ g = 3051 \div 1000\ kg$
$= 3.051\ kg$

1000 g = 1 kg

11. Express 8.51 kg in g.

$8.51\ kg = 8.51 \times \square\ g$
$= \square\ g$

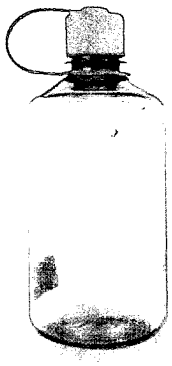
12. Express 4350 g in kg.



4350 g = 4350 ÷ ☐ kg

= ☐ kg

Volume



13. The capacity of a bottle is 1.025 ℓ.
Express it in ml.

1.025 ℓ = 1.025 x 1000 ml
= 1025 ml

1 ℓ = 1000 ml

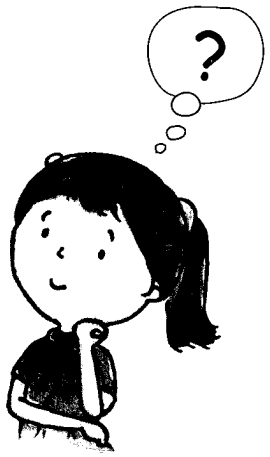
14. Express 5500 ml in ℓ.

5500 ml = 5500 ÷ 1000 ℓ
= 5.5 ℓ

15. Express 0.45 ℓ in ml.

0.45 ℓ = 0.45 x ☐ ml

= ☐ ml



16. Express 355 ml in ℓ.

355 ml = 355 ÷ ☐ ℓ

= ☐ ℓ

Conversion of Measurements Involving Decimals

1. Fill in the blanks.

(a) 91.75 m = ☐ cm

(b) 3150 cm = ☐ m

(c) 300 m = ☐ km

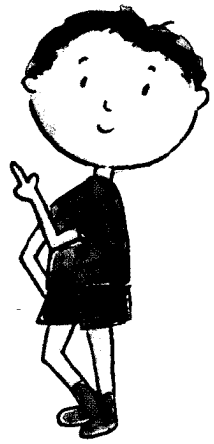
(d) 0.550 km = ☐ m

(e) 0.915 kg = ☐ g

(f) 4950 g = ☐ kg

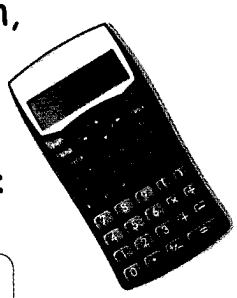
(g) 10320 ml = ☐ ℓ

(h) 0.035 ℓ = ☐ ml



Let's Learn ... Using Calculator

We can use a calculator to do addition, subtraction, multiplication and division of decimals.



1. Use a calculator to find 3.68 + 1.59
   On the key pad of a calculator, press the keys:

   The screen shows the result: 5.27.
   That is, 3.68 + 1.59 = 5.27.

2. Subtract 4.361 from 10.2 using a calculator. Then round off the answer to the nearest whole number.

   Press the keys:

   10.2 - 4.361 = 5.839
   ≈ 6

3. Add 5.254 and 3.784 using a calculator. Then round off the result to the nearest number.

   Press the keys:

   5.254 + 3.784 = 9.038
   ≈ 9

4. Multiply 1.25 x 17 using a calculator.

Press the keys:

[ ] [1] [.] [2] [5] [ ] [1] [7] [=]

1.25 x 17 = 21.25

We can make an estimation of the answer:

1.25 ≈ 1
17 ≈ 20
1.25 x 17 ≈ 1 x 20
= 20

The answer 21.25 is quite close to our estimated value, 20.
The answer 21.25 is reasonable.

5. Multiply 31.57 by 48 using a calculator.

Press the keys:

[ ] [3] [1] [.] [5] [7] [ ] [4] [8] [=]

31.57 x 48 = [ ]

We can make an estimation of the answer.

31.57 ≈ [ ]

48 ≈ [ ]

31.57 x 48 ≈ [ ] x [ ]

= [ ]

Is the answer given by the calculator close to the estimated value?
Is the answer reasonable?

6. Divide 156.6 by 18 using a calculator. Then estimate the result by first rounding off 18 to the nearest ten.

Press the keys:

[■] [1] [5] [6] [·] [6] [■] [1] [8] [=]

156.6 ÷ 18 = 8.7

18 ≈ 20

156.6 ≈ 160 (160 is a multiple of 20)

156.6 ÷ 18 ≈ 160 ÷ 20 = 8.

20 x 7 = 140
20 x 8 = 160
156.6 is closer to 160 than to 140.

The result 8.7 given by the calculator is close to the estimated value 8. The result 8.7 is a reasonable answer.

7. Divide 129.36 by 42 using a calculator. Estimate the result by first rounding off 42 to the nearest ten.

Press the keys:

[■] [1] [2] [9] [·] [3] [6] [■] [4] [2] [=]

129.36 ÷ 42 = [ ]

42 ≈ [40]

129.36 ≈ [ ] ([ ] is multiple of 40)

40 x 3 = 120
40 x 4 = 160
129.36 is closer to 120 than to 160.

So 129.36 ÷ 42 ≈ [ ] ÷ [ ] = [ ].

Is the result given by the calculator close to the estimated value?
Is the answer reasonable?

Let's Try .. Using Calculator

1. Add using a calculator. Then round off the result to the nearest whole number.

(a) 0.98 + 1.534 (b) 11.5 + 7.615

(c) 3.409 + 6.682 (d) 418.54 + 4.138

2. Subtract using a calculator. Then round off the answer to 1 decimal place.

(a) 10 - 1.269 (b) 1.005 - 0.88

(c) 8.312 - 3.077 (d) 305.17 - 60.49

3. Use calculator to do the following. Then estimate the answer by rounding off the decimal to the nearest whole number and rounding off the whole number to the nearest ten. Check if the answer given by the calculator is reasonable.

(a) 1.53 x 28 (b) 9.07 x 51

(c) 31.43 x 69 (d) 12.50 x 33

4. Use a calculator to do the following divisions. Then estimate the answer to check if the answer given by the calculator is reasonable.

(a) 454.41 ÷ 51 (b) 345.6 ÷ 48

Let's Learn ... Word Problems

1. A nurse poured 1.5 ℓ of cough mixture equally into 6 bottles. How many ml of cough mixture were there in each bottle?

$1.5\ \ell \div 6 = 0.25\ \ell$

$= 0.25 \times 1000$ ml

$= 250$ ml

There were 250 ml of cough mixture in each bottle.

2. Mr. Lee jogged along a circle pathway 5 rounds yesterday morning. The length of the circle pathway is 750 m. How many km did Mr. Lee jog yesterday morning?

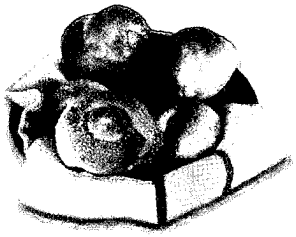
$750\ m \times 5 = 3750\ m$

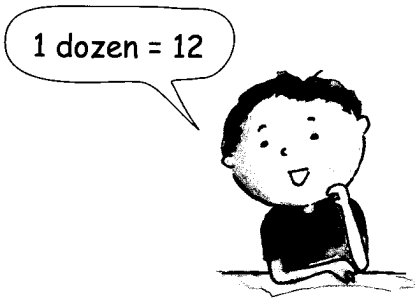
$= 3750 \div 1000$ km

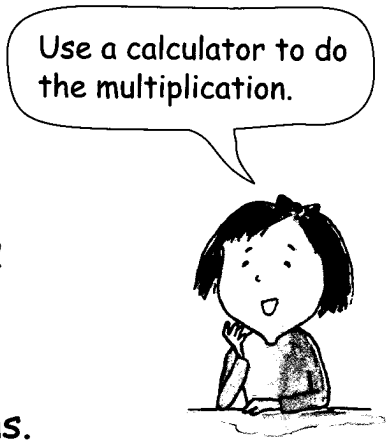
$= 3.75$ km

Mr Lee jogged 3.75 km yesterday morning.

3. A bun cost $0.49. Rajan bought a dozen of these buns. How much did he pay for them?







Total cost of the 12 buns = $0.49 x 12
= $5.88

Rajan paid $5.88 for the dozen of buns.

To check for the reasonableness of this answer, first round off the price of each bun to the nearest 10-cent and the number of buns to the nearest 10.

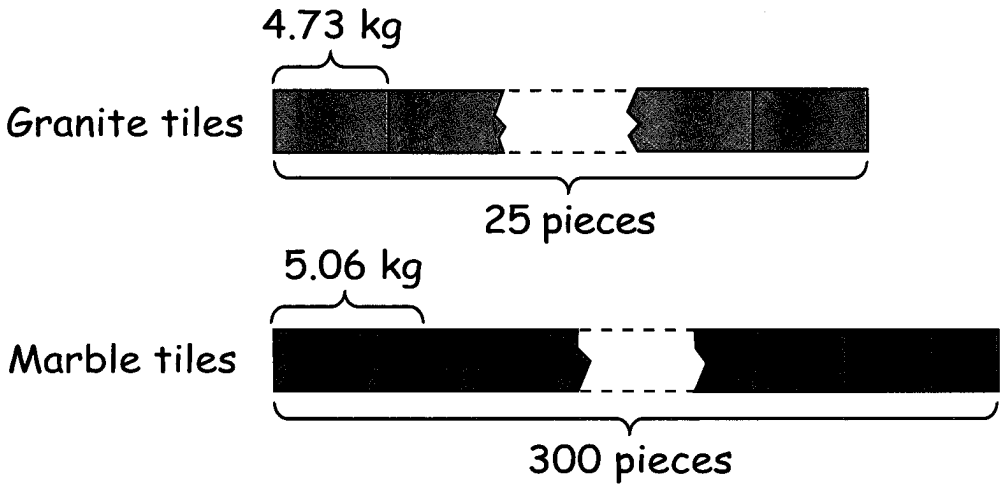
$0.49 ≈ $0.50

12 ≈ 10

$0.49 x 12 ≈ $0.50 x 10
= $5.00

The answer is close to the estimated value.
Therefore, $5.88 is a reasonable answer.

4. A lorry carries 25 pieces of granite floor tiles and 300 pieces of marble floor tiles. The mass of a granite tile is 4.73 kg and the mass of a marble tile is 5.06 kg.
Find the total mass of these tiles carried by the lorry to the nearest kilogram.

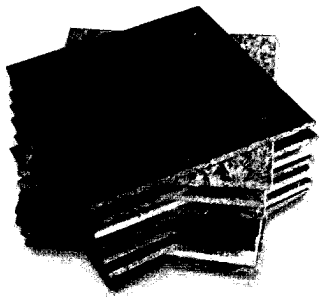


The mass of the 25 pieces of granite tiles

= 4.73 x 25
= 118.25 kg

The mass of the 300 pieces of marble tiles

= 5.06 x 300
= 1518 kg



Total mass = 118.25 + 1518
= 1636.25 kg

1636.25 kg ≈ 1636 kg (Rounded off to the nearest kilogram)

The total mass of these tiles carried by the lorry is about 1636 kg.

5. An elderly couple exercise by walking on a pebble pathway in the playground. The length of the pebble pathway is 15.6 m. Find

(a) the total distance the husband walks if he walks 14 times along the length of the pathway;

(b) the total distance the wife walks if she walks 11 times along the length of the pathway;

(c) the difference in the distances they walk.

Make an estimation to check the reasonableness of your answer.

(a) Total distance the husband walks = ☐ × ☐

= ☐

The husband walks ☐ m.

(b) Total distance the wife walks = ☐ × ☐

= ☐

The wife walks ☐ m.

(c) Difference in the distances they walk

= ☐ - ☐

= ☐

The difference in the distances they walk is ☐ m.

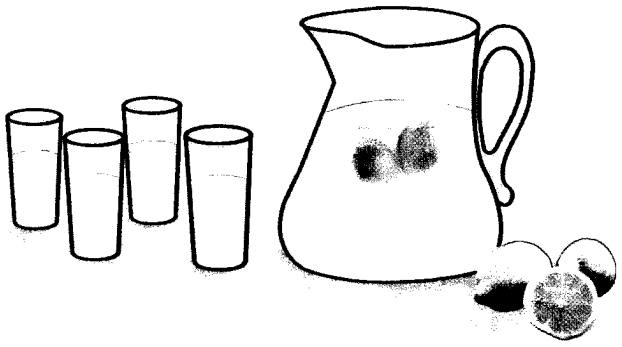
6. A jug contained 4.4 ℓ of lemonade. Tom poured 16 glasses from the jug such that each glass had 0.24 ℓ of lemonade. He poured the remaining lemonade into four cups equally. How much lemonade was there in each of the four cups? Give your answer in ml.

Total amount of lemonade in the 16 glasses = 16 x 0.24
= 3.84 ℓ

Total amount of lemonade left = 4.4 - 3.84
= 0.56 ℓ

Amount of lemonade in each cup = 0.56 ÷ 4
= 0.14 ℓ
= 140 ml

There was 140 ml of lemonade in each of the four cups.



Let's Try .. Word Problems

1. A string of 2.1 m was cut into 6 equal parts. What's the length of each part in cm?

2. The mass of 300 identical cans is 4.5 kg. What's the mass of a can in g?

3. A carpenter sawed a piece of wood into 17 equal pieces, each of length 0.32 m. Find the original length of the piece of wood. Round off the value to the nearest metre.
Make an estimation to check the reasonableness of your answer.

4. At a fun fair, a drink counter prepared 120 cans of soft drink for sale at $0.85 a can. At the end of the fun fair, 81 cans of drink were sold.
Find
(a) the sum of money collected for the sale of the soft drink and
(b) the total value of the unsold drink at the same price.

5. There was some orange juice in a container. A waitress filled 18 glasses with the orange juice from the container such that each glass contained 0.5 ℓ of juice.
Then she filled 8 identical jugs with the remaining juice. The capacity of each jug 2.225 ℓ.
Find the amount of juice in the container originally.

Go shopping with your parents. Estimate the amount of money your parents should pay for the items bought. Then compare your estimation with the actual payment. Is your estimation close enough?

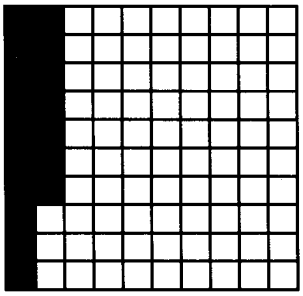
Use a calculator to check if the total is correct.

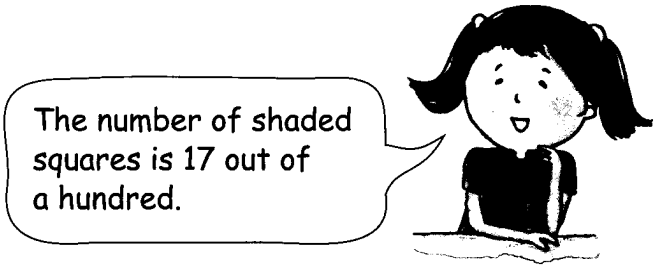

%
Percentage
BARBER
BARBER
15% off
all 'BARBER' To
SALE
ALL TOYS
20%
OFF!
$10
Do You Know?
How much will John's mother pay for a toy which originally costs $20 and is now marked at 20% off?

Let's Learn .0. Percentage

Percent

1. There are 100 squares in the diagram. 17 squares are shaded.

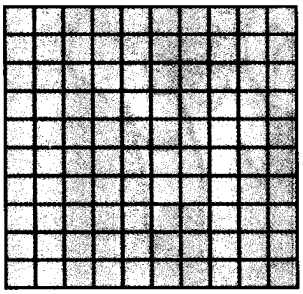




We say 17% of squares are shaded. " % " is the notation for percent.

$17\% = \frac{17}{100} = 0.17$

17% is read as seventeen percent.

2. 

The whole is 100 out of 100.

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

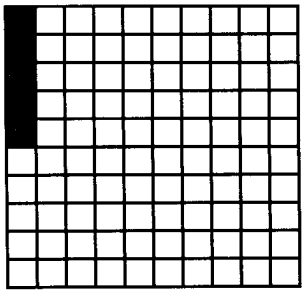
100% of the whole is shaded.

3. If only 5 squares are shaded, what percentage of the whole is unshaded?

$\frac{5}{100} = 5\%$

5% of the whole is shaded.

100% - 5% = 95%
95% of the whole is unshaded.



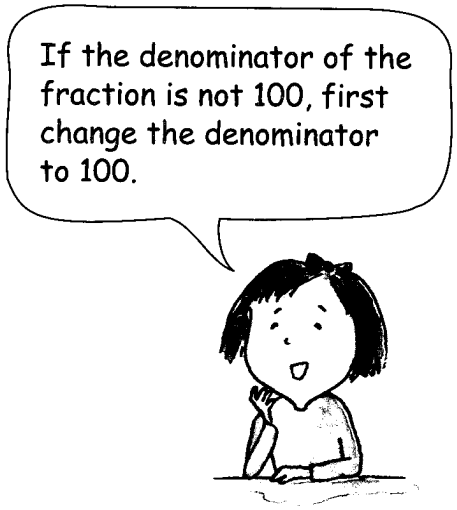
Conversion from fraction to percentage

We can write a fraction as a percentage.

4. $\frac{9}{100} = 9\%$

5. $\frac{3}{10} = \frac{3 \times 10}{10 \times 10} = \frac{30}{100} = 30\%$

6. $\frac{60}{400} = \frac{60 \div 4}{400 \div 4} = \frac{15}{100} = 15\%$



We can use another method to convert a fraction to percentage.

7. $\frac{3}{4} = \frac{3}{4} \times 100\% = \frac{300}{4}\% = 75\%$

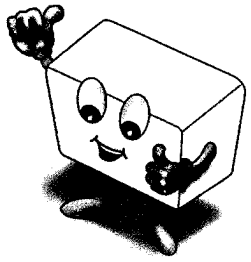
8. $\frac{50}{200} = \frac{50}{200} \times 100\% = 25\%$

Convert the following fractions to percentages.

9. $\frac{11}{100} = \square$

10. $\frac{4}{25} = \frac{4 \times \square}{25 \times \square} = \frac{\square}{100} = \square$

11. $\frac{125}{500} = \frac{125 \div \square}{\square \div \square} = \frac{\square}{100} = \square$

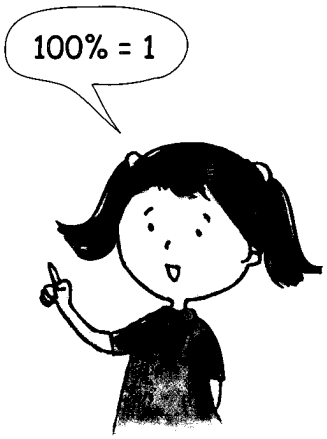


12. $\frac{3}{25} = \frac{3}{1\cancel{25}} \times \cancel{100}^{4}\% = \square$

Conversion from decimal to percentage

We also have two methods to convert decimal to percentage.

13. $0.35 = \frac{35}{100} = 35\%$



or $0.35 = 0.35 \times 100\% = 35\%$

14. $0.08 = \frac{\square}{100} = 8\%$

or $0.08 = 0.08 \times 100\% = \square$

15. $0.1 = \frac{\square}{100} = \square$

or $0.1 = 0.1 \times 100\% = \square$

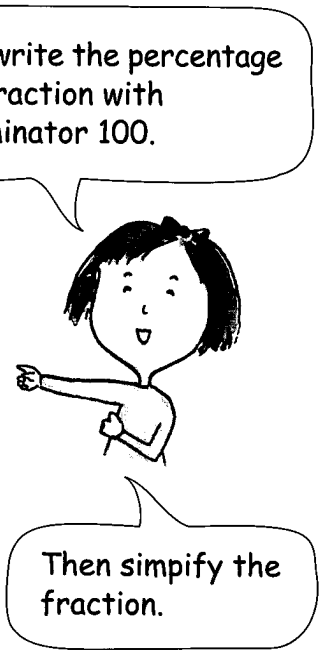
Conversion from percentage to fraction

16. $35\% = \frac{35}{100} = \frac{35 \div 5}{100 \div 5} = \frac{7}{20}$

17. $2\% = \frac{2}{100} = \frac{2 \div 2}{100 \div 2} = \frac{1}{50}$

18. $65\% = \frac{65}{100} = \frac{65 \div 5}{\square \div \square} = \frac{\square}{\square}$

19. $42\% = \frac{\square}{100} = \frac{\square \div \square}{100 \div \square} = \frac{\square}{\square}$



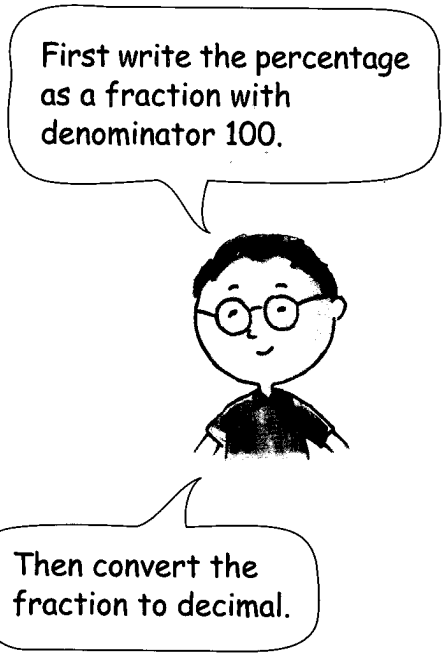
Conversion from percentage to decimal

20. $65\% = \frac{65}{100} = 0.65$

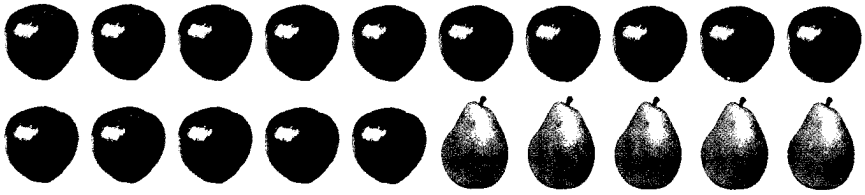
21. $9\% = \frac{9}{100} = 0.09$

22. $30\% = \frac{\square}{\square} = \square$

23. $79\% = \frac{\square}{\square} = \square$



24. There are 20 fruits. 15 of them are apples. What percentage of the fruits are apples?

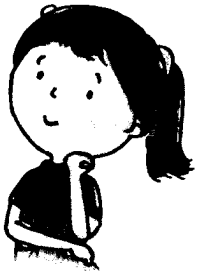


$\frac{15}{20} = \frac{75}{100} = 75\%$

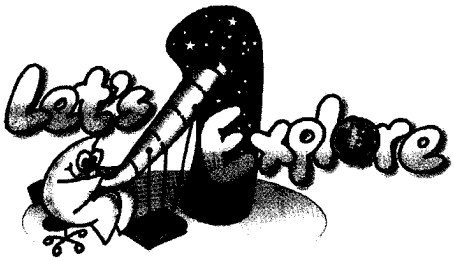
75 % of the fruits are apples.

25. There are 25 children and 15 of them are boys. What percentage of the children are boys?

$\frac{15}{25} = \frac{\square}{100} = \square\ \%$



$\square$ % of the children are boys.



Work in pairs.

Write down a list of 5 places where you actually encounter percentages. Discuss what you have written down.

For example: 5% discount for all textbooks in a book shop.

Let's Try .. Percentage

1. Express the following as a percentage.

   (a) $\frac{17}{100}$ (b) $\frac{36}{100}$ (c) $\frac{98}{100}$

   (d) $\frac{3}{10}$ (e) $\frac{12}{20}$ (f) $\frac{35}{500}$

2. Express the following as a fraction in its simplest form.

   (a) 51% (b) 48% (c) 76%

3. Express each of the following as a percentage.

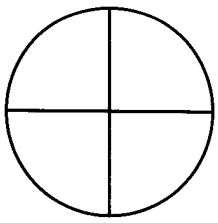
   (a) 0.5 (b) 0.90 (c) 0.64

4. Express each of the following as a decimal.

   (a) 48% (b) 19% (c) 88%

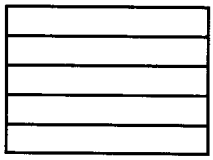
5. Shade the parts accordingly. (Hint: express each percentage as a fraction in its simplest form first)

   (a)

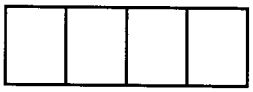
   25%

   (b)

   20%

   (c)

   75%

Let's Learn .. Part and Whole

1. There are 1800 pupils in a primary school. Among them, 28% are Malay pupils. How many Malay pupils are there in the school?

Method 1

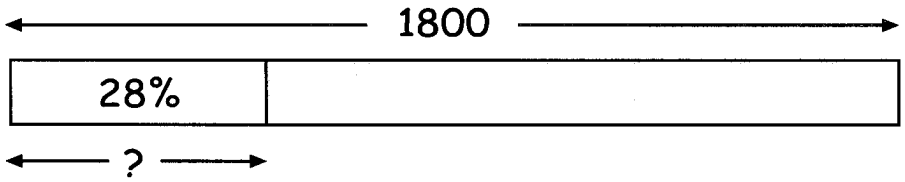
$28\% \text{ of } 1800 = \frac{28}{\cancel{100}} \times \cancel{1800}$

$= 28 \times 18$

$= 504$

$28\% = \frac{28}{100}$

Method 2



$100\% \longrightarrow 1800$

$1\% \longrightarrow \frac{1800}{100} = 18$

$28\% \longrightarrow 28 \times 18 = 504$

There are 504 Malay pupils in the school.

2. What is 62% of 88?

Method 1

$62\% \text{ of } 88 = \frac{62}{100} \times 88$

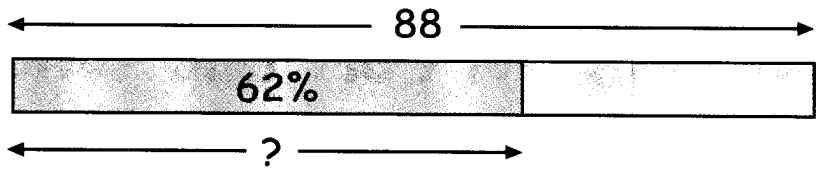
$62\% = \frac{62}{100}$

$= \frac{62 \times 88}{100}$

$= \frac{5456}{100}$

$= 54.56$

Method 2

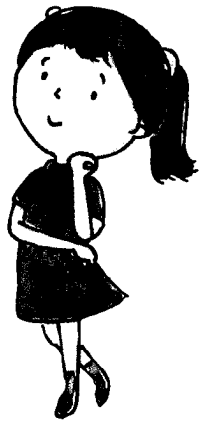


$100\% \longrightarrow 88$

$1\% \longrightarrow \frac{88}{100} = 0.88$

$62\% \longrightarrow 62 \times 0.88 = 54.56$

3. What is 25% of 800.



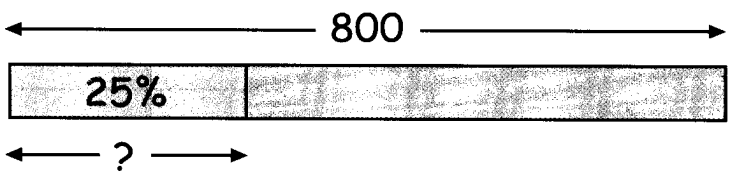
Method 1

(a) $25\% \text{ of } 800 = \frac{25}{\square} \times \square$

$= \square \times \square$

$= \square$

Method 2



100% ⟶ 800

1% ⟶ $\frac{800}{100}$ = ☐

25% ⟶ 25 × ☐ = ☐

.0. Part and Whole

1. Find the value of each of the following.

   (a) 30% of 100 (b) 25% of 125

   (c) 50% of 200 (d) 80% of 450

   (e) 7% of 700 (f) 40% of 1000

2. Jane has 48 marbles. 25% of them are in blue. How many blue marbles does Jane have?

3. A fruit seller bought 240 apples and sold 75% of them on the first day. How many apples did he sell on the first day?

Let's Learn ... Word Problems

1. At a sale, a discount of 20% was given for all items in a shoe shop. Mrs Tan bought a pair of shoes. The original price of the pair of shoes was $75. How much did she pay?

Discount = 20% of $75

$$= \frac{20}{100} \times \$75$$

$$= \$15$$

Actual price = original price − discount
= $75 − $15
= $60

She paid $60 for the pair of shoes.

2. Jason plans to open a bank account with a deposit of $2500. The bank pays an annual interest of 2.5%. What will be the amount of money in Jason's account after one year?

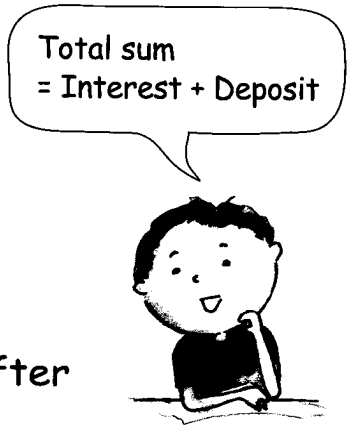
Interest earned in a year = 2.5% of $2500

$$= \frac{2.5}{100} \times \$2500$$

$$= \$62.50$$

Amount of money in Jason's account after one year = interest + deposit
= $62.50 + $2500
= $2562.50

The amount of money in Jason's account after one year will be $2562.50.



3. Mr Bala bought a washing machine at $800. He also paid 7% GST (Goods and Services Tax) for this price. How much did he pay altogether?

Amount of GST paid = 7% of $800

$$= \frac{7}{100} \times \$800$$

$$= \$56$$

Total amount paid = $800 + $56
= $856

Mr Bala paid $856 altogether.

4. A school has 1500 pupils. On a certain day, 30 of the pupils were absent.
   (a) Find the percentage of the pupils who were present on that day.
   (b) If 40% of the pupils absent were girls, how many girls were absent on that day?

(a) Number of pupils who were present = 1500 - 30 = 1470

The percentage of pupils who were present

$$= \frac{1470}{1500} \times 100\% = 98\%$$

98% pupils were present on that day.

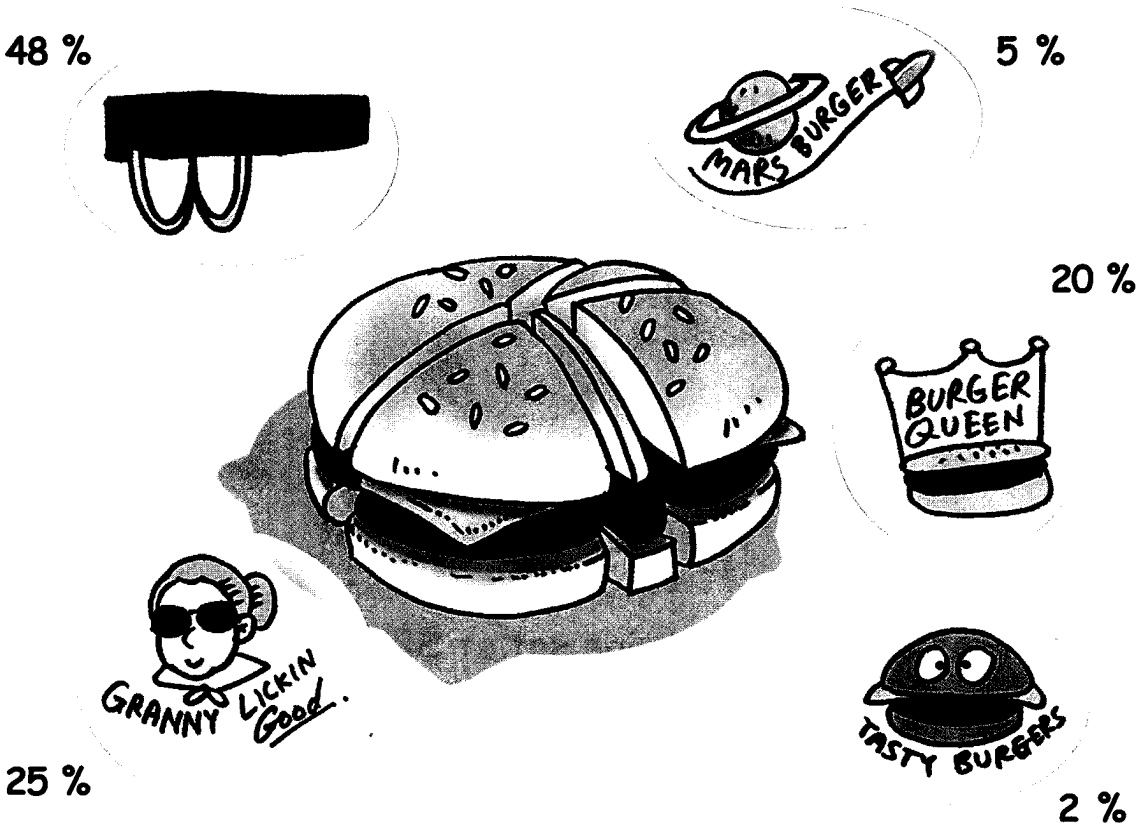
(b) Number of girls who were absent
= 40% of the number of pupils who were absent

$$= \frac{40}{100} \times 30 = 12$$

12 girls were absent on that day.

Work in groups.

The following information shows the market shares of various burger chains in a city. The total sale of burgers in the city is $300 million each year.



Using the above information, design some word problems involving percentage. Then try to solve them.

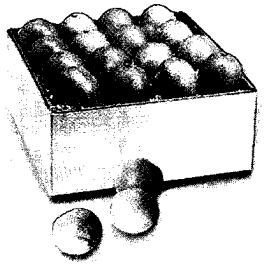
.. Word Problems

1. Mrs Wang deposited $4500 in a bank. The bank paid 2% interest per year. How much money would she have in the bank after 1 year?

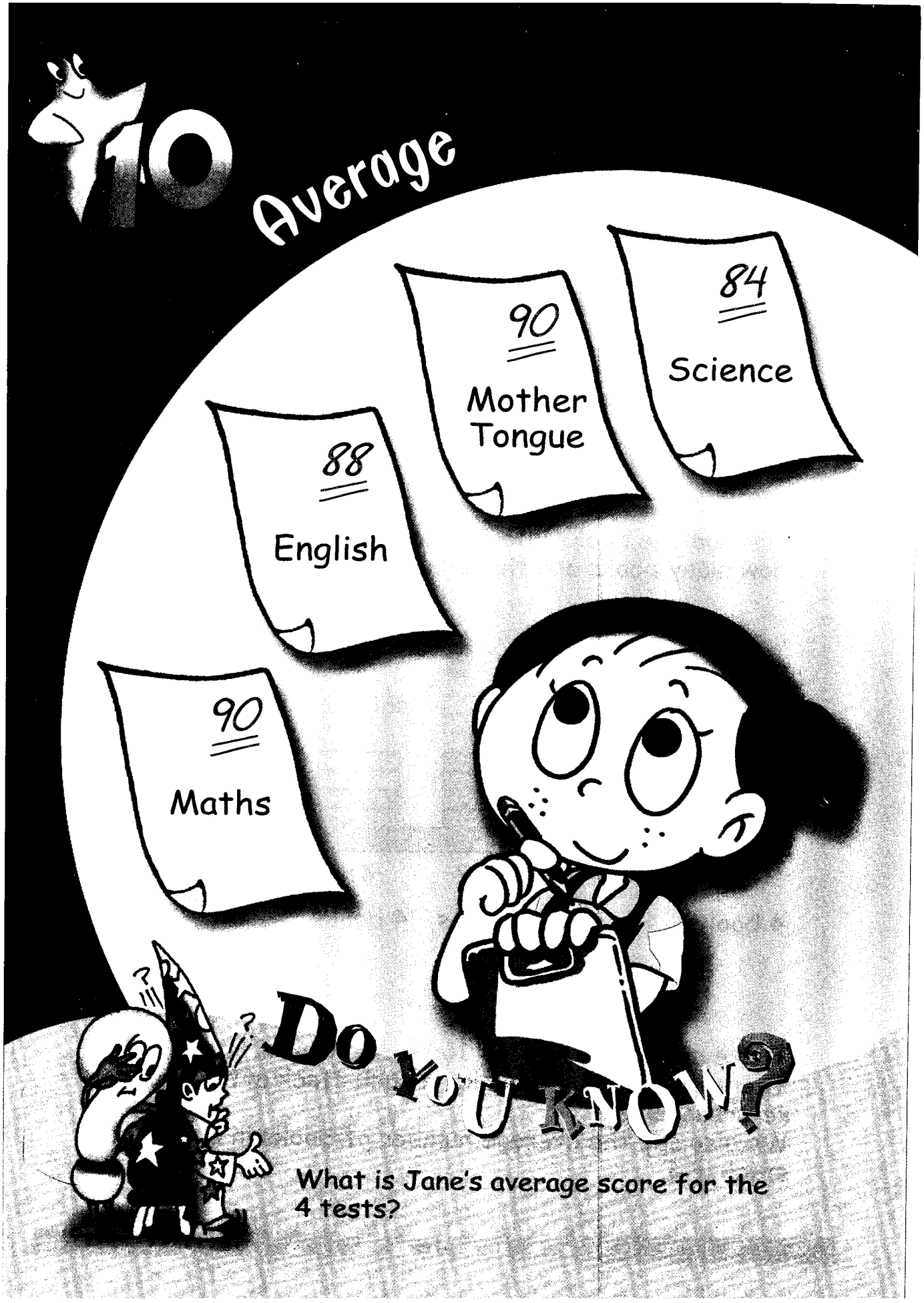
2. There are 50 questions in a test. David answered 80% of them correctly. How many questions did David answer incorrectly?

3. Mr Raju's monthly salary is $1500. He spends 55% of his monthly salary and saves the rest. How much money does he save every month?

4. A shopkeeper bought a box containing 120 oranges. He found that 6 of the oranges were rotten. What percentage of the oranges were in good condition?

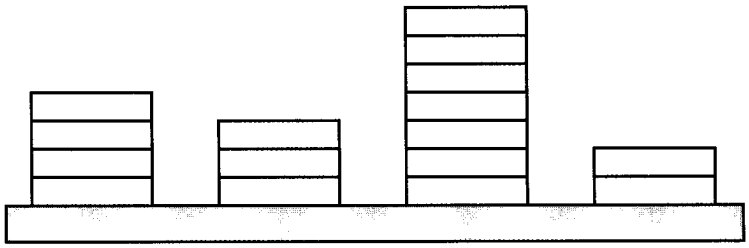


5. Mr Tan bought a television set at $2599. He also paid 7% GST for this price. How much did he pay altogether?


10
Average
90
Mother Tongue
84
Science
88
English
90
Maths
DO YOU KNOW?
What is Jane's average score for the 4 tests?

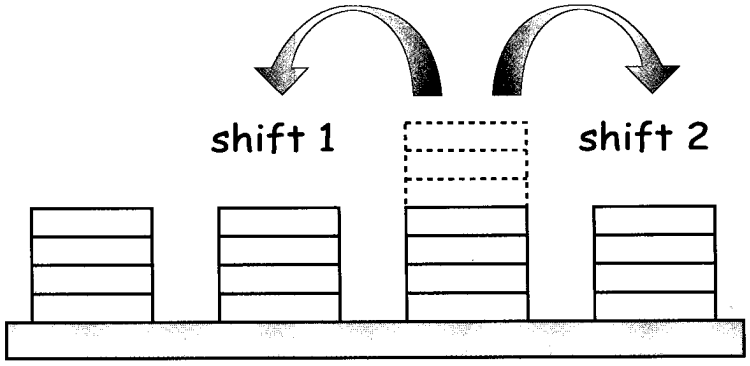
Let's Learn .·. Average

1. There are four stacks of books on the table as shown.

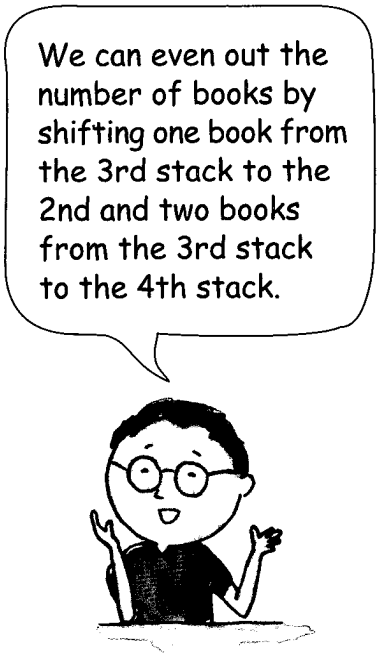


1st	2nd	3rd	4th
4 books	3 books	7 books	2 books

Arrange the books into 4 equal stacks.
How many books are there in each stack?

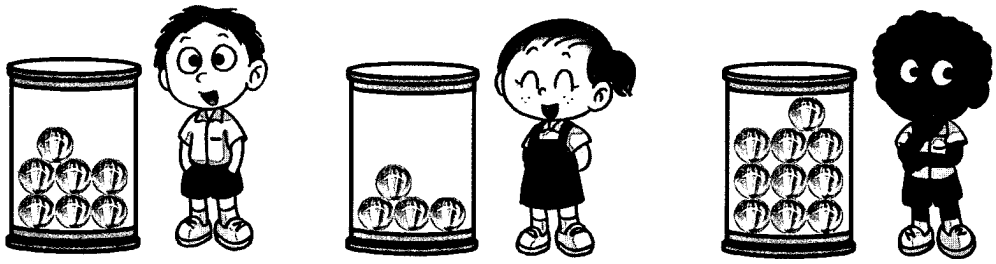


1st	2nd	3rd	4th
4 books	4 books	4 books	4 books



There are 4 + 3 + 7 + 2 = 16 books in total.
There are 16 ÷ 4 = 4 books in each stack after the re-arrangement.
We also say the average number of books in each stack is 4.

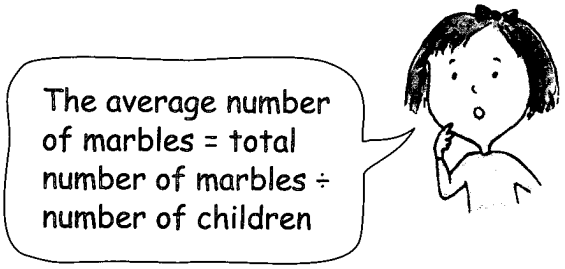
2. John, Mary and Ali have 7, 4 and 10 marbles respectively. What is the average number of marbles each of them has?



John Mary Ali

They have 7 + 4 + 10 = 21 marbles in total.

The average number of marbles each of them has
= 21 ÷ 3
= 7



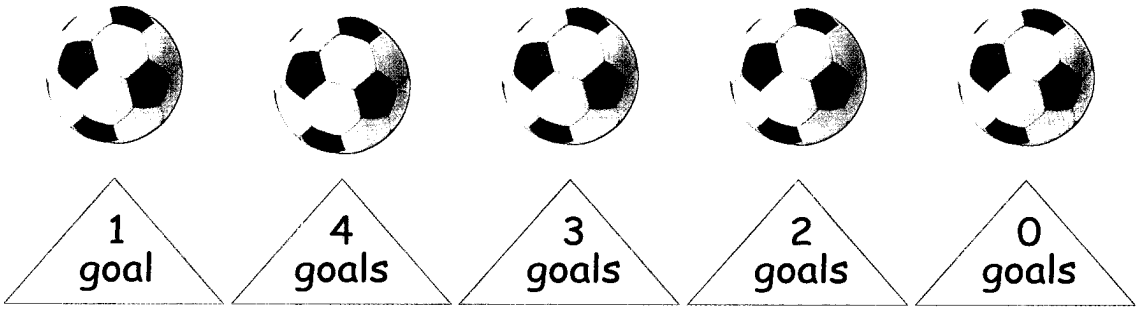
3. What is the average of the five numbers 8, 2, 4, 6 and 5?

Total of 5 numbers = 8 + 2 + 4 + 6 + 5
= 25

Average = 25 ÷ 5
= 5

The average of the 5 numbers is 5.

4. The number of goals scored by the school's soccer team in 5 games are shown below.



Find the average number of goals scored by the team.

First, we have to find the total number of goals scored in these games.

Total number of goals = ☐ + ☐ + ☐ + ☐ + ☐

= ☐

Number of games played = 5

Average number of goals scored
= Total number of goals ÷ Total number of games played

= ☐ ÷ 5

= ☐

The average number of goals scored by the school's soccer team is ☐ goals.

5. The masses of 3 children are shown below.

[redacted] 24 kg 21.6 kg

What is their average mass?

Total mass of the 3 children = ☐ + ☐ + ☐

= ☐ kg

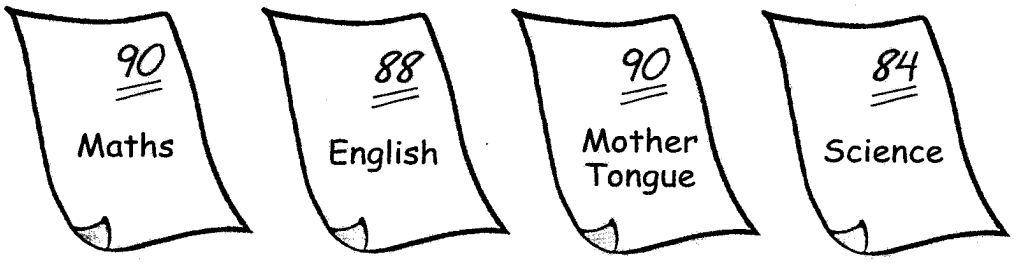
Number of children = ☐

Average mass of the children = ☐ ÷ ☐

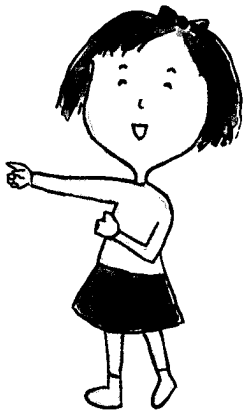
= ☐ kg

The average mass of the children is ☐ kg.

6. Let's look at the question on this chapter's opening page (P. 45).



The total score for the 4 tests
= 90 + 88 + 90 + 84
= 352



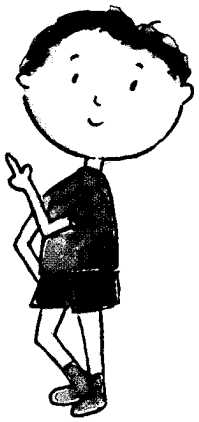
Jane's average score for the 4 tests
= 352 ÷ 4
= 88

7. Nurul's average score for the 4 tests is 86. What is her total score for the 4 tests?

Total score
= Average score x Number of tests.
= 86 x 4
= 344

The total score for the 4 tests is 344.

8. Peter spent an average of $4.65 per day for a week. How much did he spend altogether in the week?



1 week = 7 days

$4.65 x 7 = $32.55

He spent $32.55 altogether in the week.

Work in groups.

Measure the height of each member in your group. Record the data in a table. Calculate the average height of your group and the average height of the tallest and the shortest members in your group. Are these two values the same?

.•. Average

1. Find the average of each of the following:

   (a) 10, 25, 50 and 35

   (b) 12.6, 30.7 and 9.6

   (c) 1.25 m, 3.8 m and 5.25 m

   (d) 41.6 kg, 39.5 kg, 44.1 kg and 38.4 kg

   (e) $2.70, $2.20, $1.70 and $3.50

2. Solve the following problems.

   (a) A boy drank an average of 1.7 ℓ of water each day. How much water did he drink in 7 days?

   (b) An office worker typed at an average speed of 60 words a minute. How many words did she type in half an hour?

   (c) A man earned an average of $2500 per month. How much did she earn in half a year?

3. Tom has 21 toy cars, David has 15 toy cars and Tim has 18 toy cars. On the average, how many toy cars does each boy have?

4. The average length of 5 sticks is 15 cm. What is the total length of the 5 sticks?

5. The total number of cookies on 4 plates is 36. What is the average number of cookies on each plate?

Let's Learn .. Word Problems

1. The result slip below shows Michelle's Mathematics test scores for her Continual Assessment. She accidentally spilled ink on it and now her second test score cannot be seen. However, her teacher told her that her average score of two tests is 70 marks.

   Can you find out what is Michelle's second test score?

Mathematics	1st test	2nd test
Test Score	60	

Total score of items
= Average score x Number of tests

Number of tests = 2

Total marks scored = 70 x 2
= 140

Score of 1st test = 60

Score of 2nd test = 140 - 60

= 80

Marks of 2nd test
= Total marks - Marks of 1st test

Michelle scored 80 marks for her second test.

2. The average height of 2 boys is 131.6 cm. The average height of 4 girls is 128.3 cm. What is the average height of all the children?

Total height of the boys = 2 x 131.6
= 263.2 cm

Total height of the girls = 4 x 128.3
= 513.2 cm

Total number of children = 2 + 4 = 6

$$\text{Average height of the children} = \frac{\text{Total height of children}}{\text{Total number of children}}$$

$$= \frac{263.2 + 513.2}{6}$$

$$= \frac{776.4}{6}$$

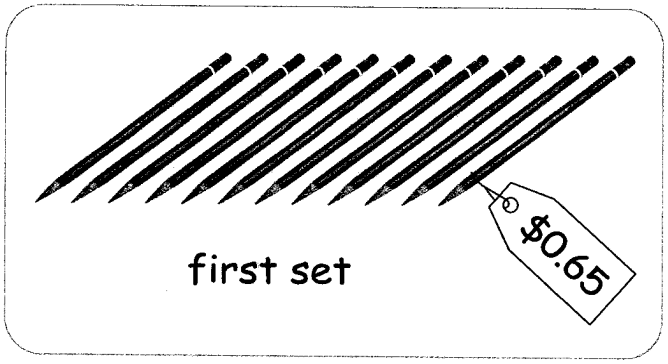
= 129.4 cm

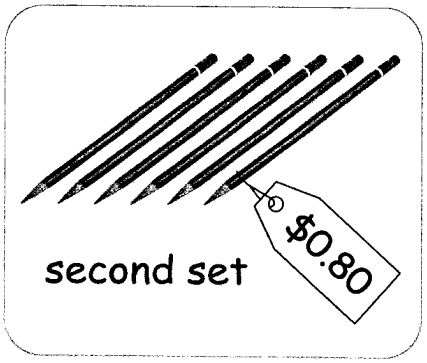
The average height of all the children is 129.4 cm.

Peter solved the above problem in the following way.
Is he right? Why?

$$\frac{131.6 + 128.3}{2} = 129.95$$

3. John bought a dozen pencils at $0.65 each. He bought another half a dozen at $0.80 each. How much did he pay for each of the pencils on the average?





Cost of the first set of one dozen pencils

= ☐ × ☐

= ☐

1 dozen = 12

$\frac{1}{2}$ dozen = 6

Cost of the second set of half a dozen of pencils

= ☐ × ☐

= ☐

Total cost of all the pencils = ☐ + ☐ = ☐

Total number of pencils = ☐ + ☐ = ☐

$$\frac{\text{Total cost of all the pencils}}{\text{Total number of pencils}} = \frac{\square}{\square} = \square$$

He paid an average of ☐ for each pencil.

4. The average mass of 25 parcels is 20 kg. The average mass of 24 of the parcels is 19 kg. What is the mass of the 25th parcel?

Total mass of the 25 parcels = 25 x 20
= 500 kg

Total mass of the 24 parcels = 24 x 19
= 456 kg

Mass of the 25th parcel = 500 - 456
= 44 kg

The mass of the 25th parcel is 44 kg.

.•. Word Problems

1. Peter scored an average of 75 marks for his first two monthly mathematics tests. After the third monthly test, his average score for the three tests became 81. How many marks did he score in the third mathematics test?

2. The average cost of 10 wooden chairs is $120. The average cost of another 15 wooden chairs is $125. What is the average cost of the 25 wooden chairs?

3. The average height of 15 boys and 20 girls in a class is 1.5 m. The average height of the girls is 1.45 m. What is the average height of the boys? Round off your answer to 2 decimal places.

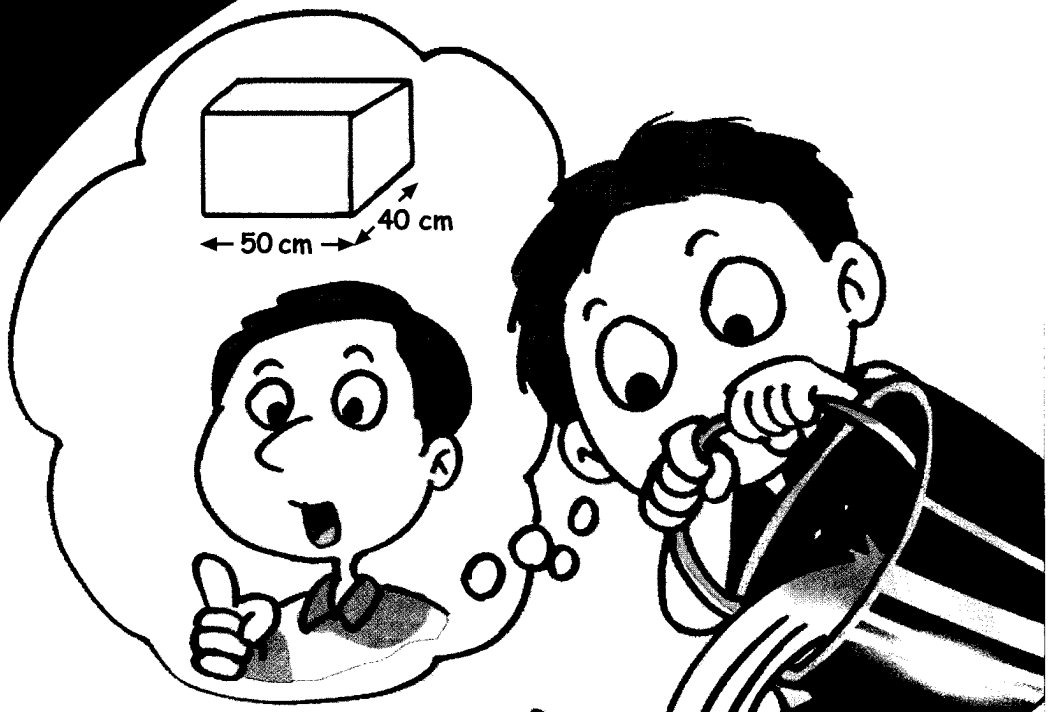
Collect your household utility bills for the last 4 months. Record the costs of electricity, water and gas consumptions in each month. Calculate the average cost of each item for the 4 months.

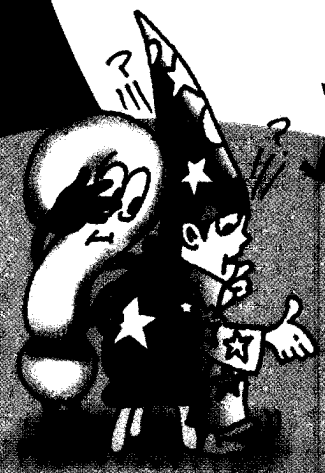
Compare each average you have calculated with the average of the country.

Discuss with your parents ways to lower the cost.

CURRENT MONTH CHARGES	Usage	Rate ($)	Amount ($)	Total ($)
Electricity Services				
Electricity	7 kWh	0.2049	1.43	
Reading taken on 16-08-2006 : 29404				
Electricity	240 kWh	0.2115	50.77	**52.20**
Gas Services by City Gas Pte Ltd				
Gas	16 kWh	0.1691	2.71	
Reading taken on 16-08-2006 : 13364				
Gas	143 kWh	0.1760	25.17	**27.88**
Water Services by Public Utilities Board				
Reading taken on 16-08-2006 : 2691.5				
Water	13.0 Cu M	1.17	15.22	
Waterborne Fee	13.0 Cu M	0.30	3.90	
Sanitary Appliance Fee	2 Fittings	3.00	6.00	**25.12**
Refuse Removal by Colex Holdings Ltd				
Refuse	1 Qty	5.68	5.68	**5.68**
Water Conservation Tax	$15.22	30%	4.57	**4.57**
Goods & Services Tax	$105.55	5%	5.27	**5.27**
Total Charges for this month				**$120.72**

11 Volume



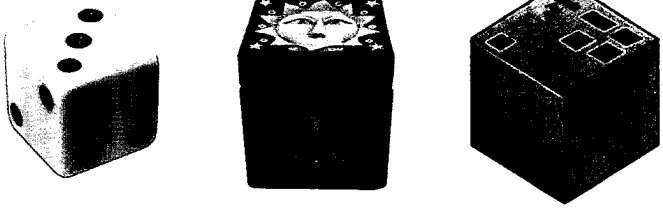


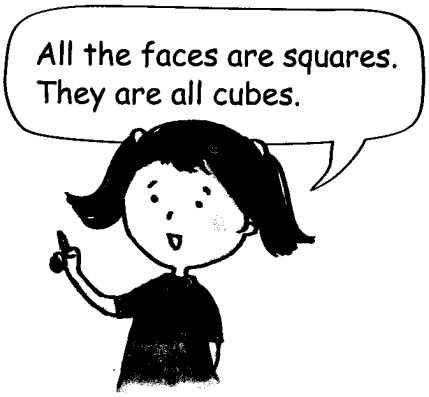
Do You Know?

Peter wants to fill the fish tank such that the height of the water level is 30 cm. How much water should Peter pour in?

Let's Learn 10. Cubes and Cuboids

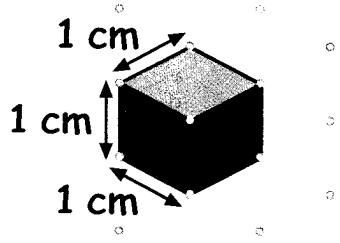
Look at the following objects.





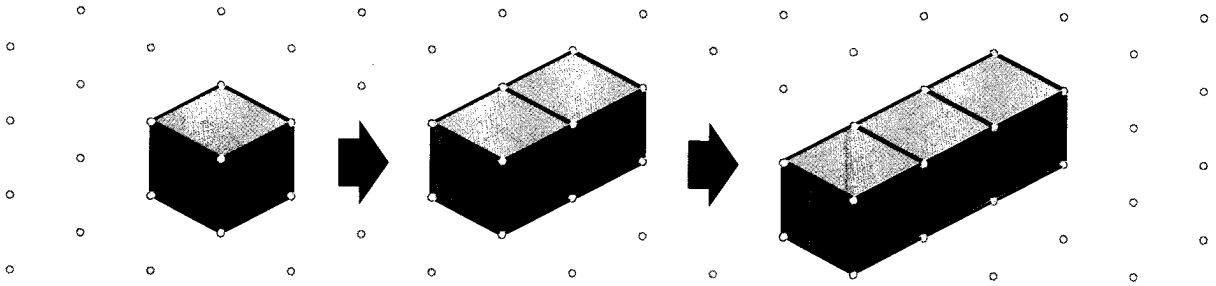
What is common about them?

The figure below shows a 1-cm cube.
Each edge of the cube is 1 cm.
This is a unit cube.



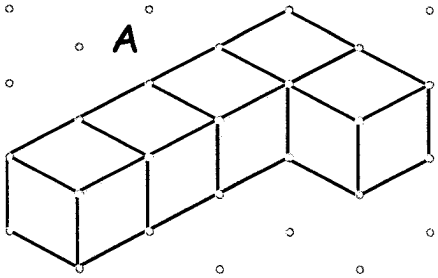
unit cube

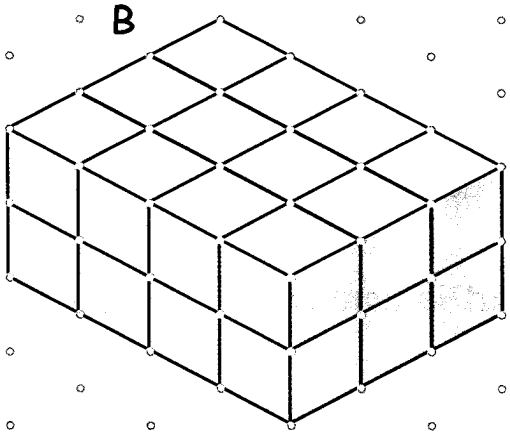
When more unit cubes are added, we get various solids.

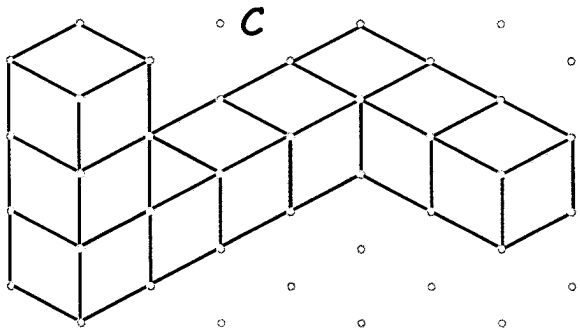


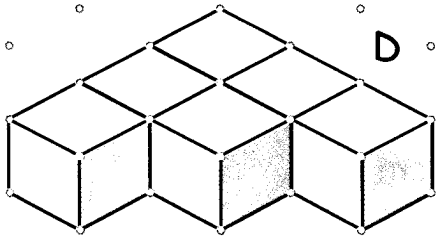
1 unit cube 2 unit cubes 3 unit cubes

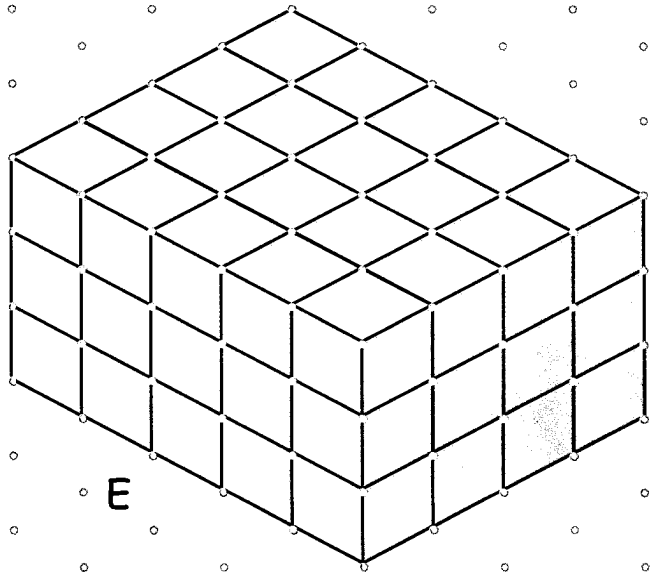
The following solids are made of unit cubes. Use some unit cubes to build the following solids.



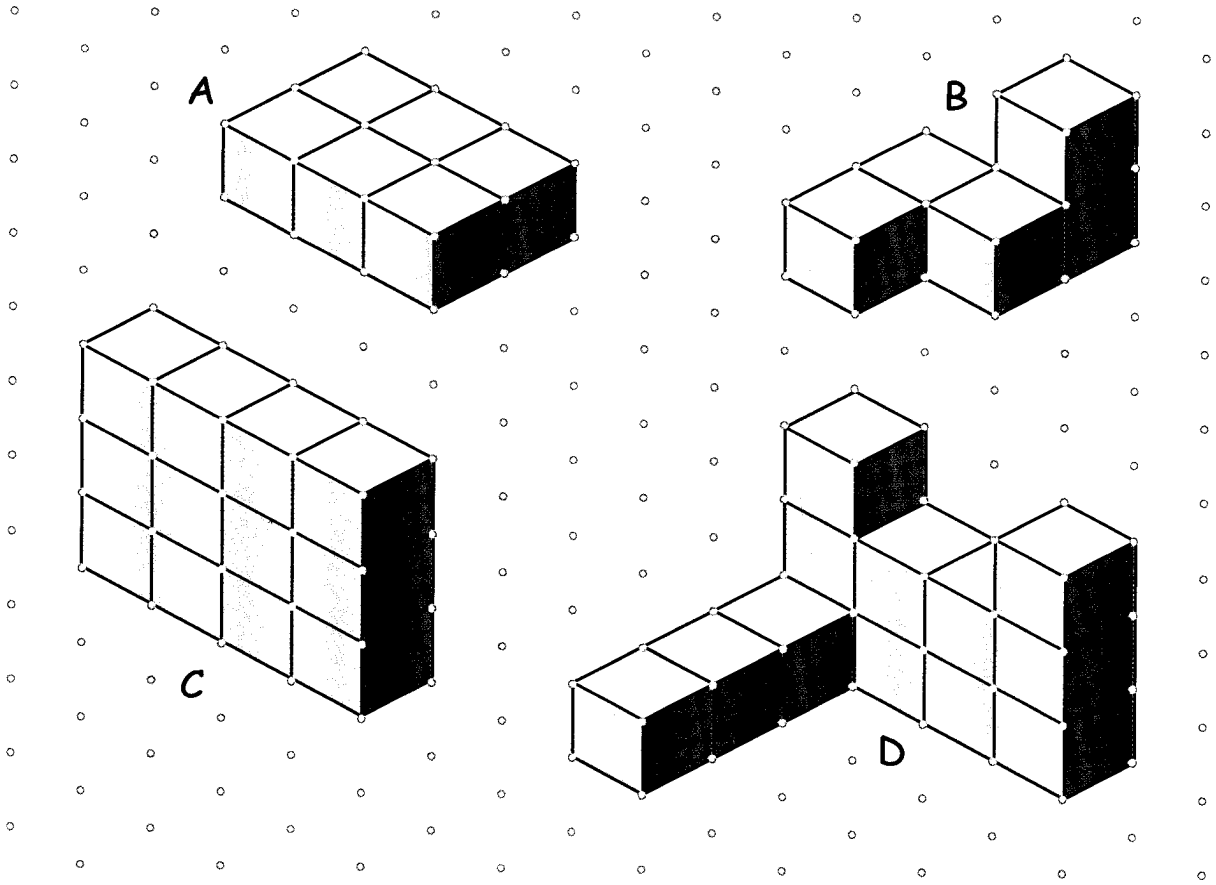




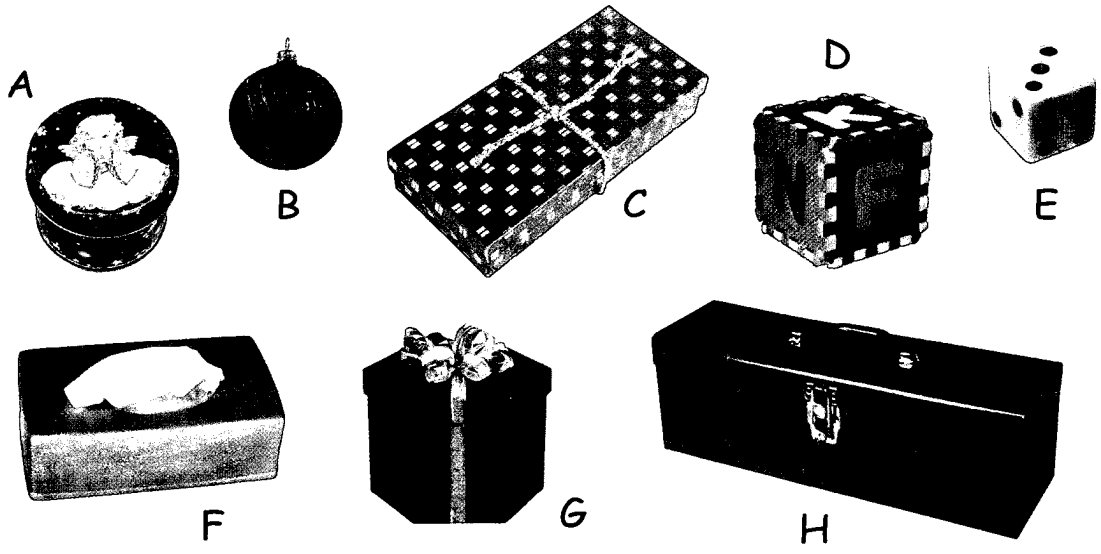




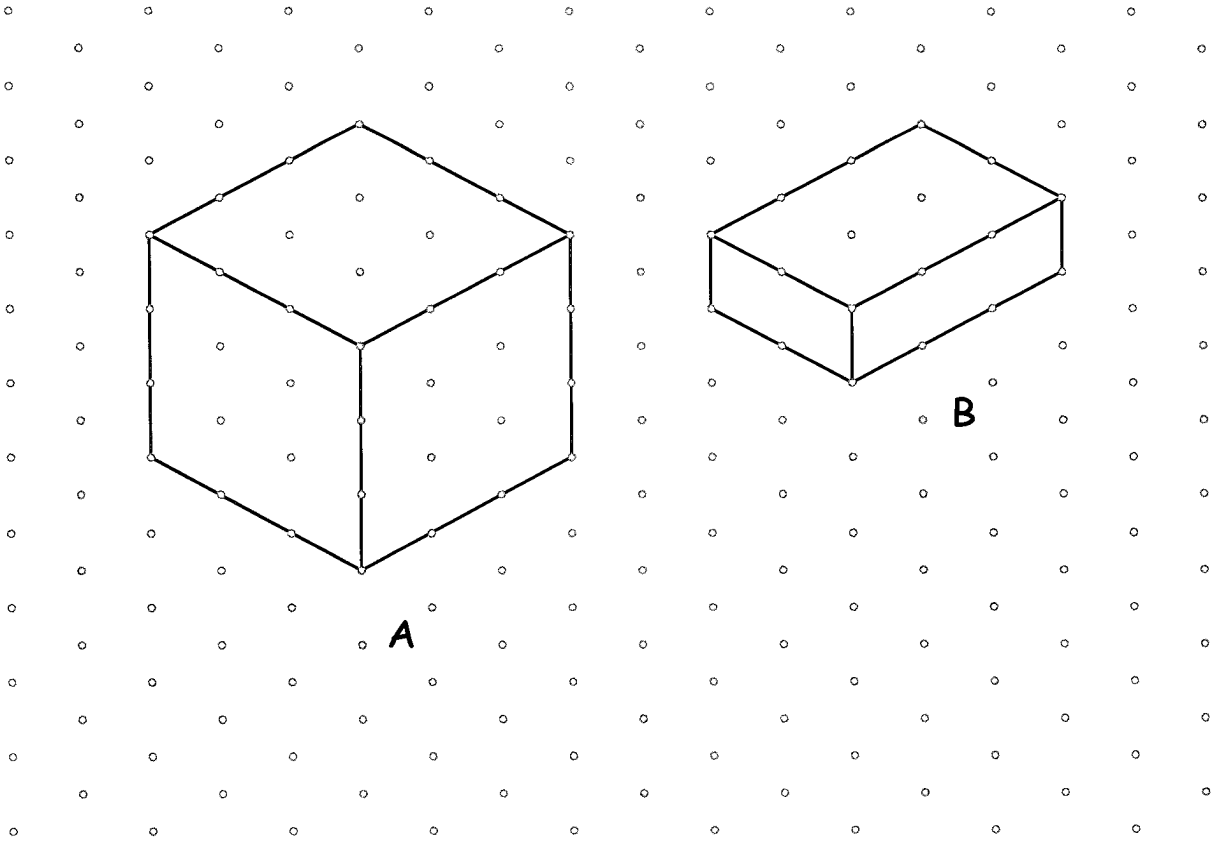
1. In the figures below, ☐ and ☐ are cuboids.



2. Among the following objects, which are cubes? Which are cuboids?



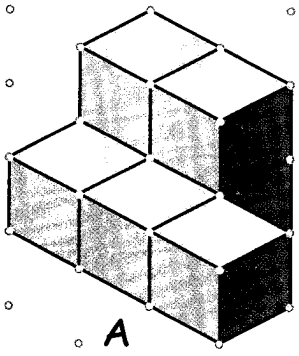
We can draw cubes and cuboids on dot grid as shown below.



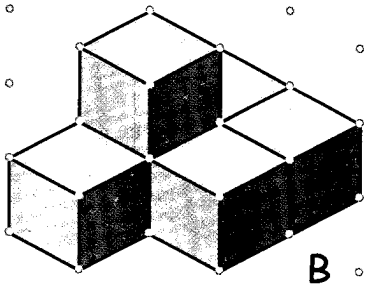
Work in pairs.

In a given time of 5 minutes each, write down as many examples as you can of cubes and cuboids around you. Compare results with your partner and see who has more examples.

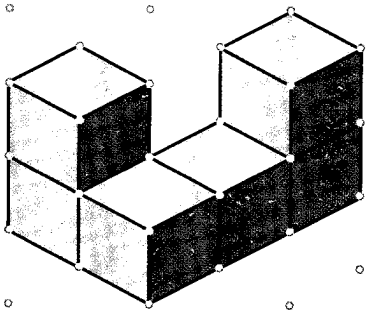
Here are more solid figures made of unit cubes.



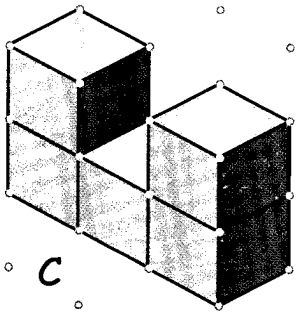
A



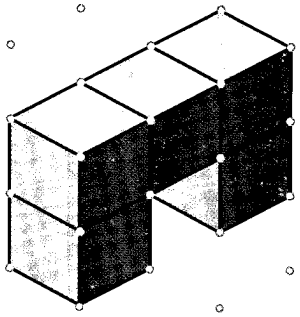
B



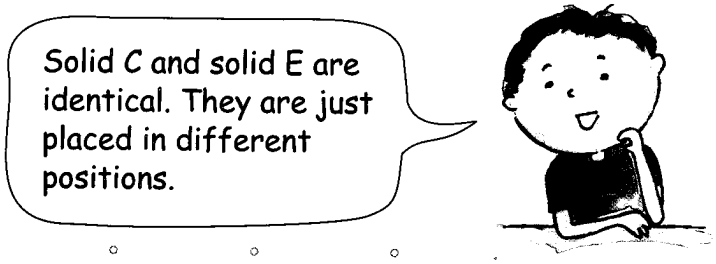
D



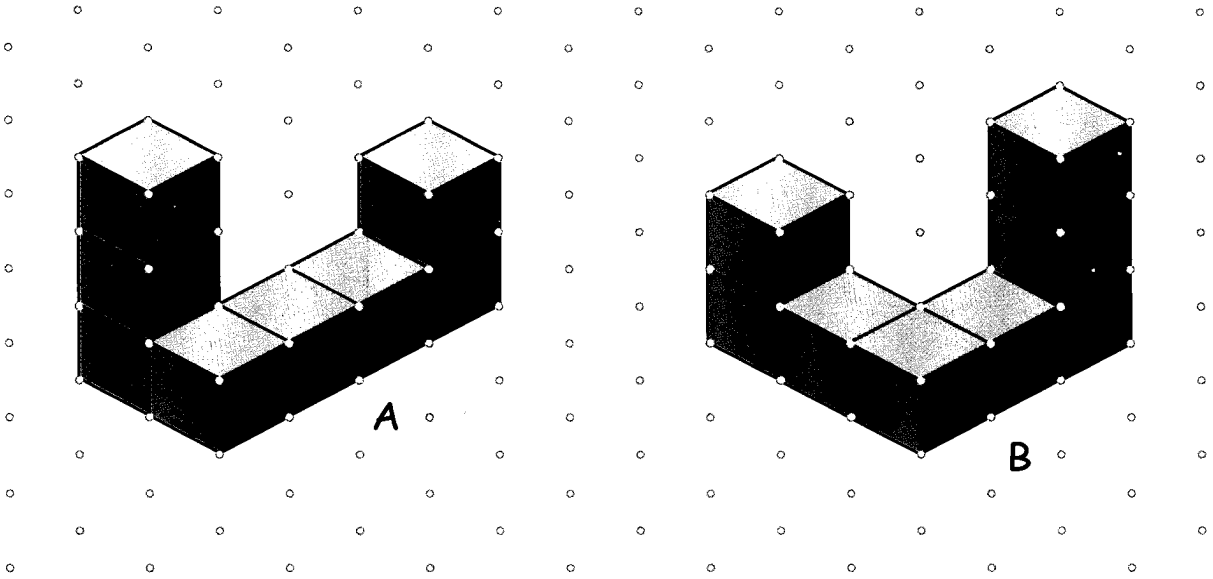
C



E

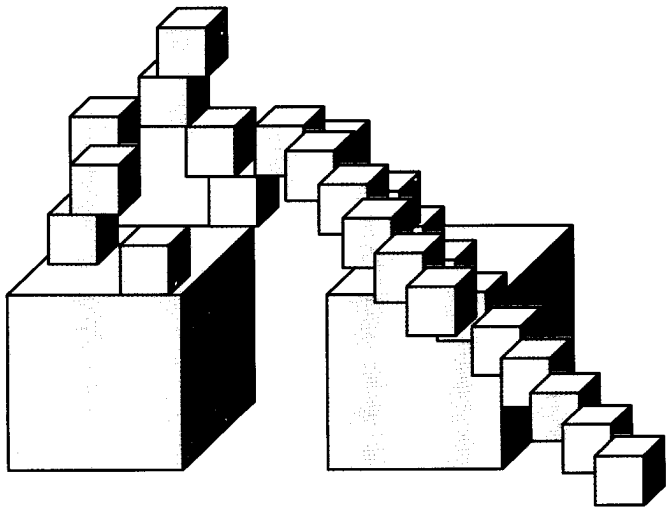


Are solid A and solid B identical? Give a reason for your answer.



Work in pairs.

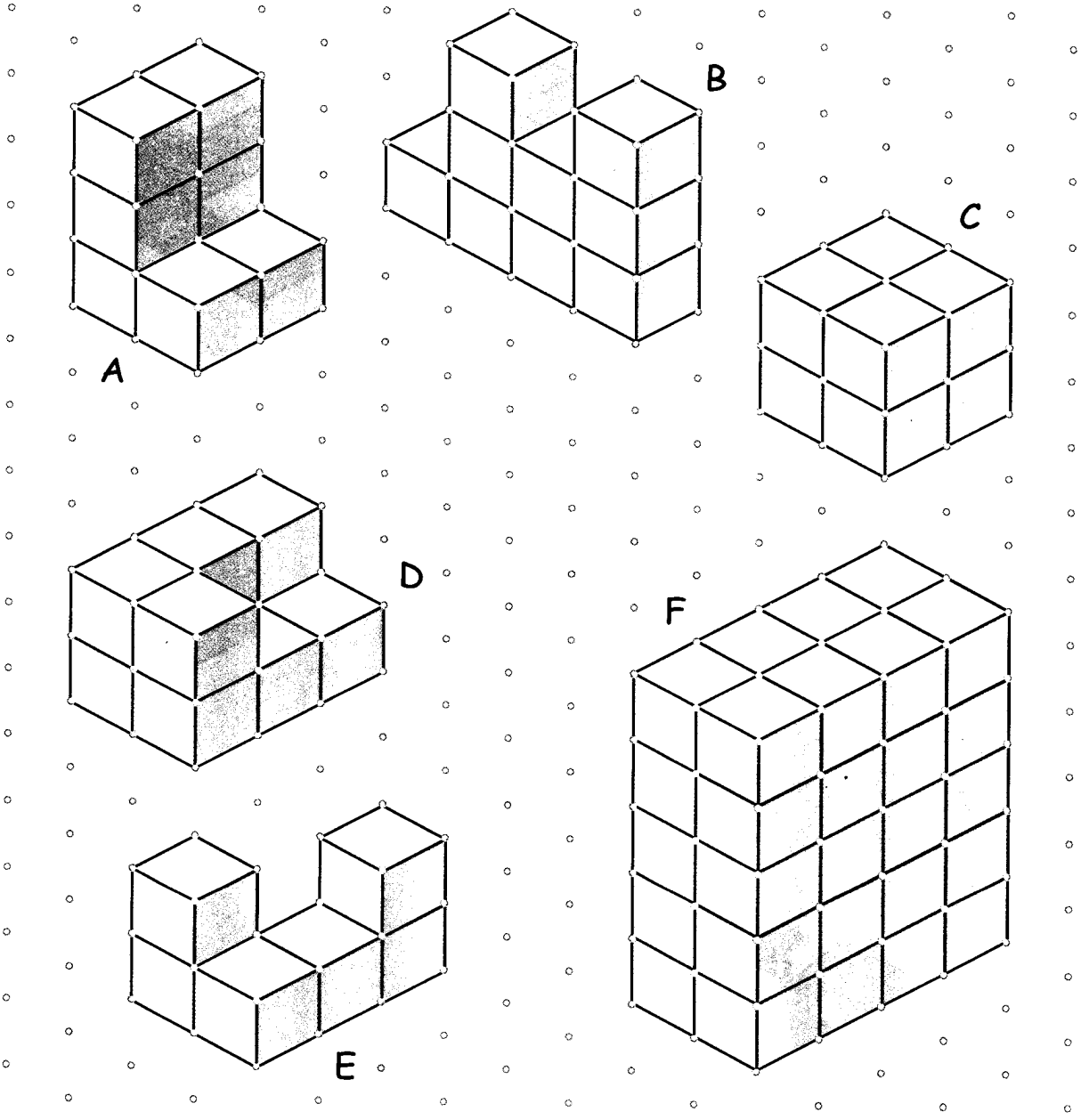
Design a structure that you would like to be built in your school compound using cubes. The structure should reflect the core values, mission and vision of your school.



Use a computer software you are familiar with to draw the structure. Print it out and submit it to your teacher.

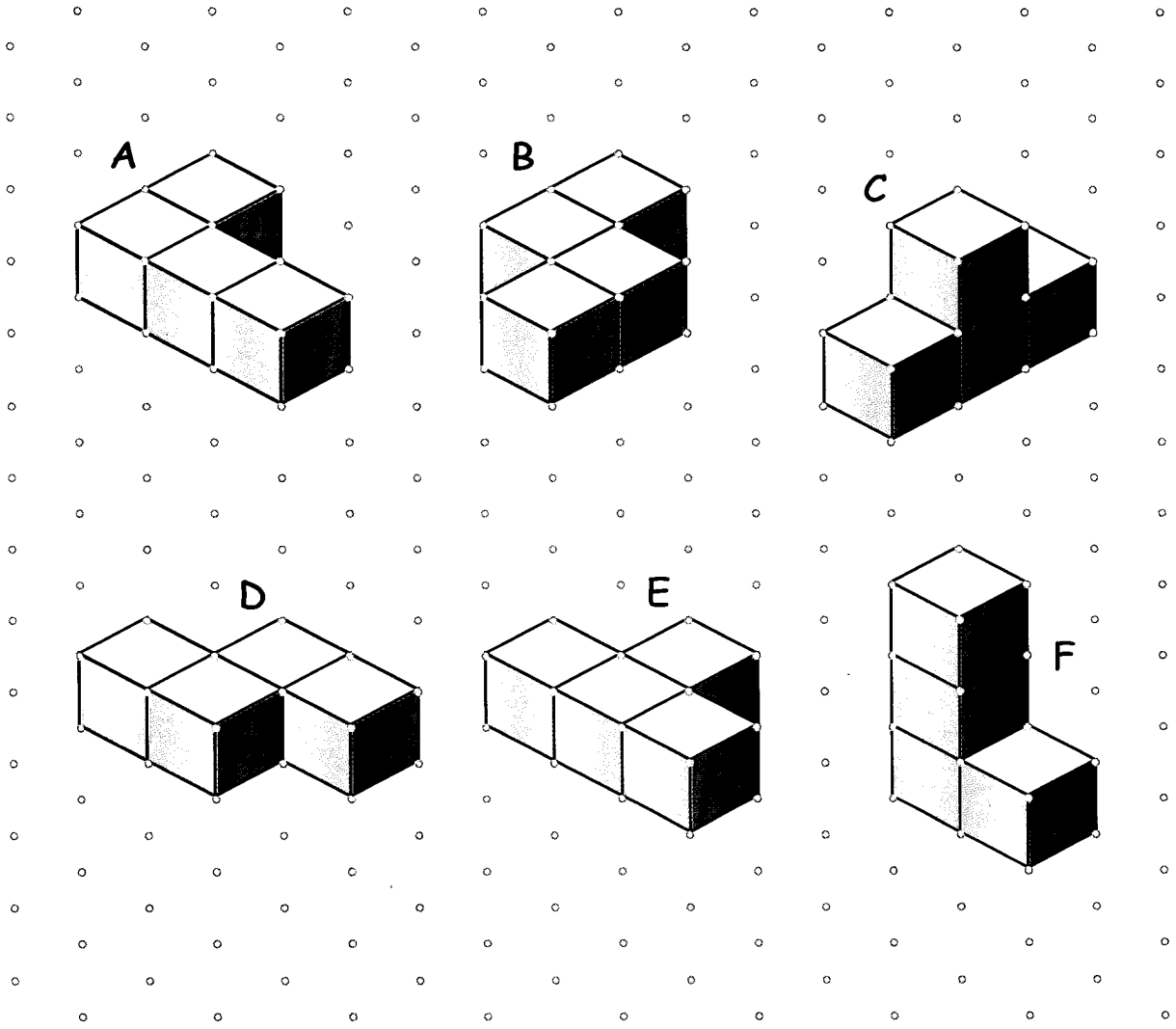
Let's Try .·. Cubes and Cuboids

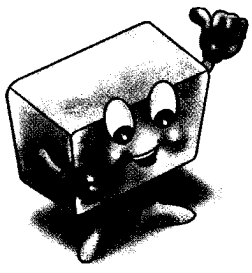
1. Look at the following solid figures. They are made up of unit cubes. Answer the questions that follow.



(a) Which figure is a cube?
(b) Which figure is a cuboid?
(c) Which two figures are made up of the same number of unit cubes?

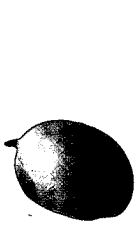
2. Identify the solids of the same shape and then match them using a line.



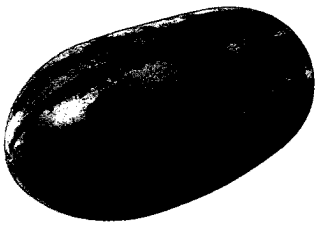


Let's Learn .. Volume and Cubic Units

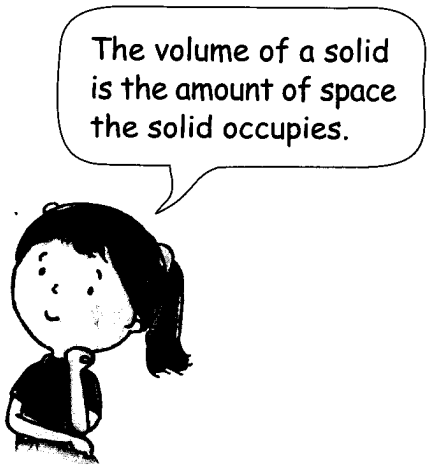
Volume



A



B



B takes up more space then A.
The volume of B is greater than A.

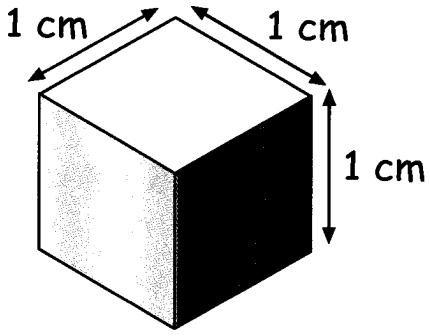
C

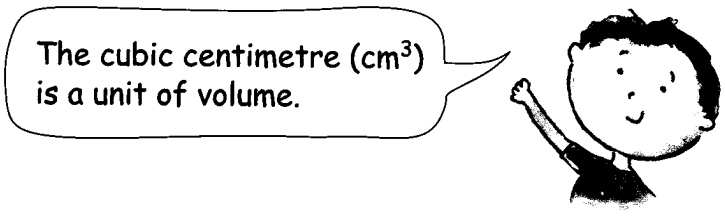
D

The volume of ☐ is greater.

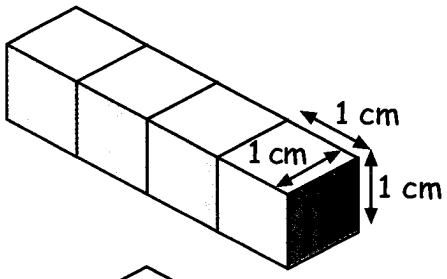
Cubic units

The volume of the 1-cm cube is 1 cubic centimetre (cm^3).



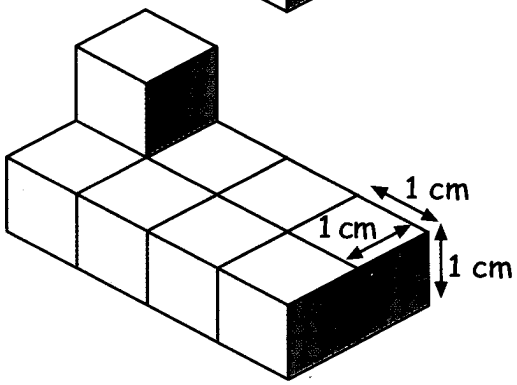


1. Count the number of 1-cm cubes in the following solids and find their volumes.



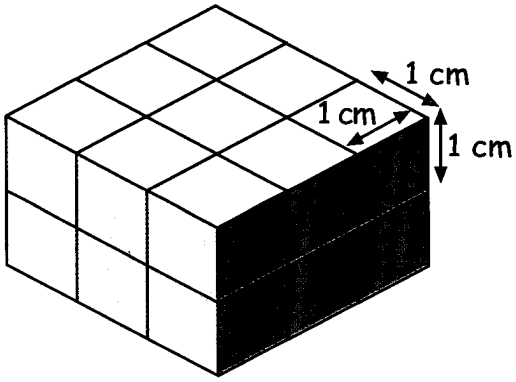
Volume of a cube = 1 cm^3

Volume of 4 cubes = 1 x 4
= 4 cm^3

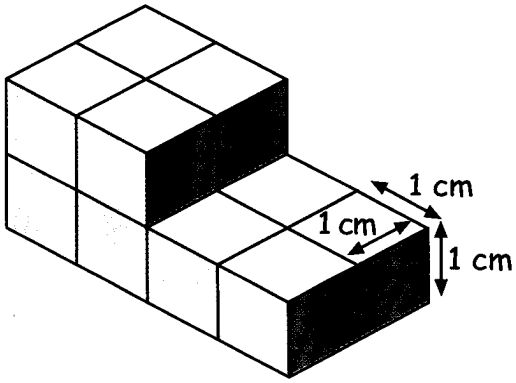


Volume of a cube = 1 cm^3

Volume of 9 cubes = 1 x 9
= 9 cm^3



3 x 3 = 9
There are 9 cubes in a layer.
There are 2 layers in all.
Total number of cubes = 9 x 2
= 18
Volume of a cube = 1 cm^3
Volume of the solid
= 1 x 18
= 18 cm^3

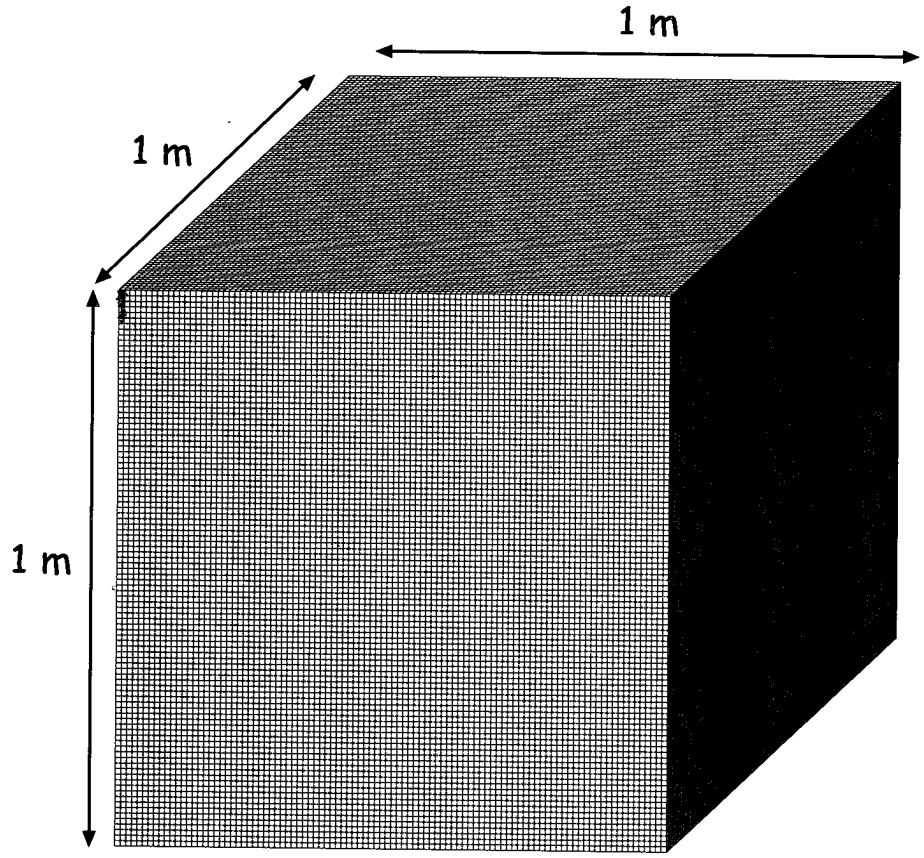


4 x 2 = 8
There are 8 cubes in the bottom layer.

2 x 2 = 4
There are 4 cubes in the top layer.

Total number of cubes = 8 + 4 = 12

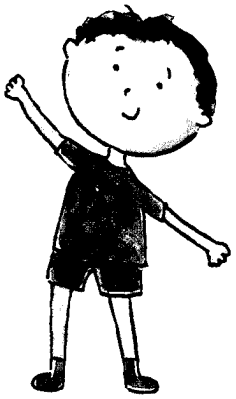
Volume of a cube = 1 cm^3
Volume of the solid = 1 x 12
= 12 cm^3



1-m cube

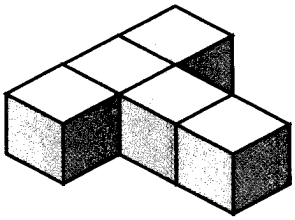
Volume of the 1-m cube is 1 cubic metre (m^3). It is also a unit of volume.

1 cubic metre is often used as the unit for the volumes of large solids.



2. The following solids are made up of 1-cm cubes.
Find the volume of each solid.

(a)

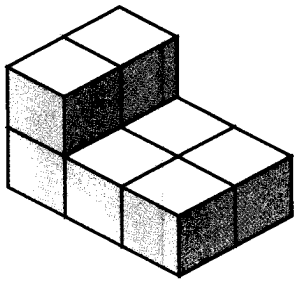


Number of 1-cm cubes = ☐

Volume = ☐ x ☐

= ☐ cm^3

(b)



Top layer = ☐ cubes

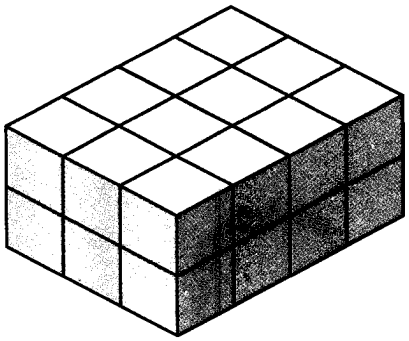
Bottom layer = ☐ x ☐

= ☐ cubes

Total = ☐ cubes

Volume = ☐ x ☐ = ☐ cm^3

(c)



Top layer = ☐ x ☐

= ☐ cubes

Bottom layer = ☐ x ☐

= ☐ cubes

Total = ☐ cubes

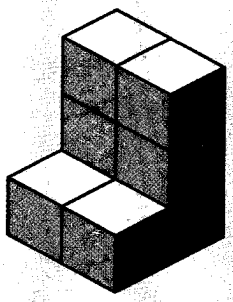
Volume = ☐ x ☐

= ☐ cm^3

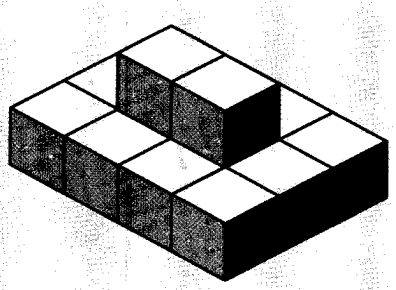
Let's Try .. Volume and Cubic Units

The following solids are made up of 1-cm cubes.
Find the volume of each of these solids.

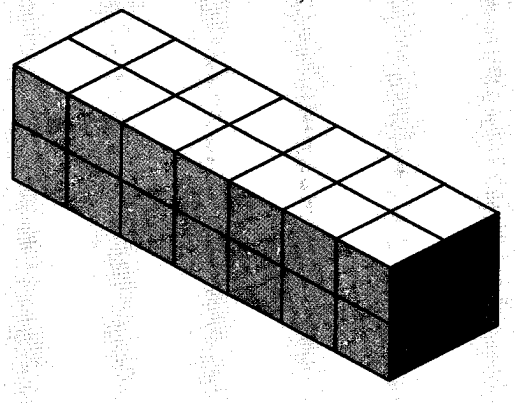
(a)



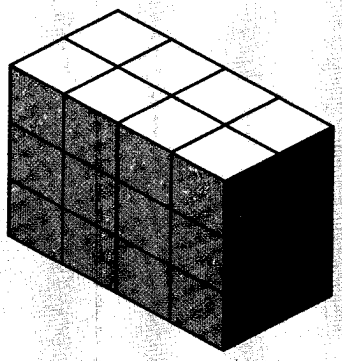
(b)



(c)



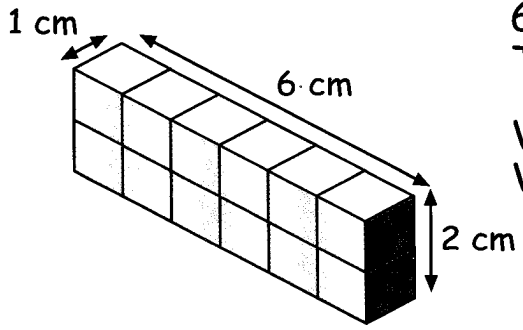
(d)



Let's Learn .. Volume of Cuboids and Cubes

Let's find the volume of each of the following cuboids by counting the number of unit cubes.

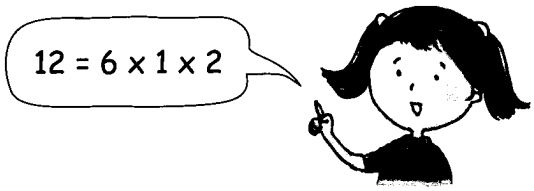
1.



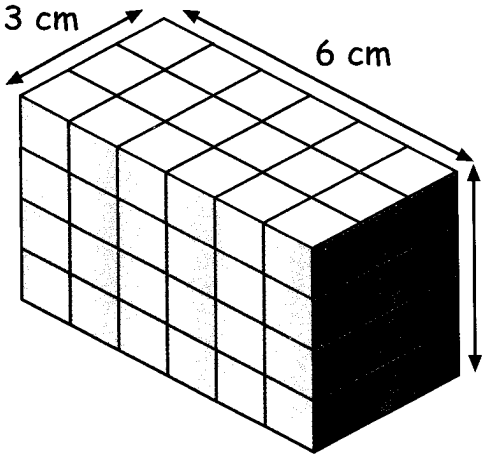
There are 6 unit cubes in 1 layer.

$6 \times 2 = 12$
There are 12 unit cubes in 2 layers.

Volume of a unit cube = 1 cm^3
Volume of the cuboid = 1×12
= 12 cm^3



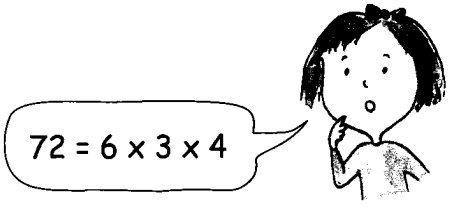
2.



$6 \times 3 = 18$
There are 18 unit cubes in 1 layer.

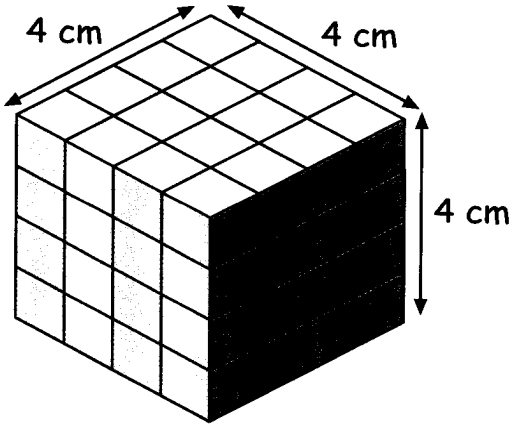
$18 \times 4 = 72$
There are 72 unit cubes in 3 layers.

Volume of a unit cube = 1 cm^3
Volume of the cuboid = 1×72
= 72 cm^3



Volume of cuboid = length x breadth x height
$V = l \times b \times h$

3.

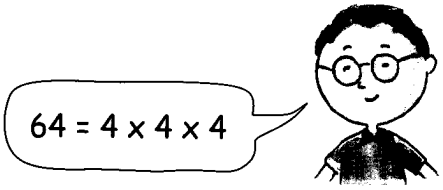


$4 \times 4 = 16$
There are 16 unit cubes in 1 layer.

$16 \times 4 = 64$
There are 64 unit cubes in 4 layers.

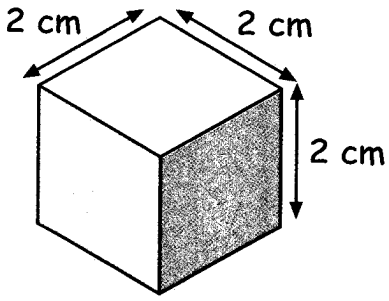
Volume of a unit cube = 1 cm^3

Volume of the cube = 1×64
$= 64\ cm^3$

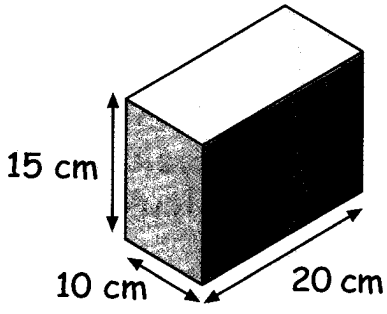


Volume of cube = length of side x length of side x length of side
$V = l \times l \times l$

4. Calculate the volume of each of the following.



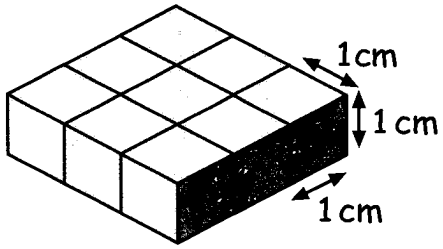
Volume of the box = $l \times l \times l$
$= 2 \times 2 \times 2$
$= 8\ cm^3$



Volume of the tank = $l \times b \times h$
$= 20 \times 10 \times 15$
$= 3000\ cm^3$

5. Find the volume of each of the following solids.

(a)

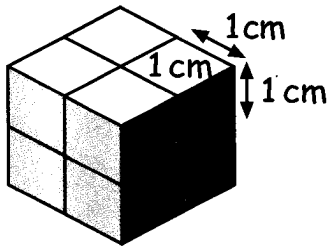


$V = l \times b \times h$

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

$= \square$ cm^3

(b)

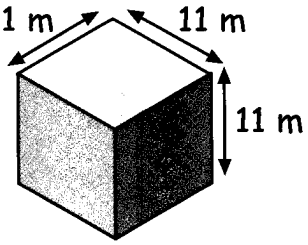


$V = l \times l \times l$

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

$= \square$ cm^3

(c)

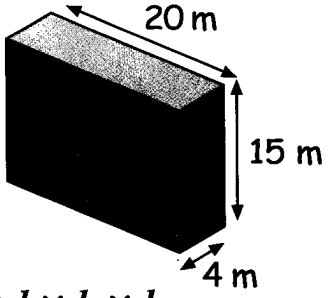


$V = l \times l \times l$

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

$= \square$ m^3

(d)



$V = l \times b \times h$

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

$= \square$ m^3

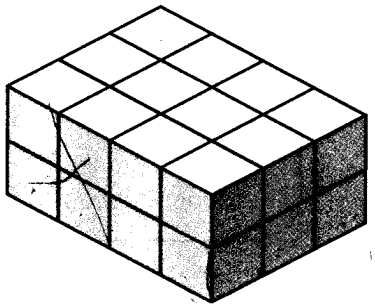
Measure and record the length, breadth and height of some objects in the shape of a cuboid, such as a thick book and a pencil box. Then calculate their volumes using a calculator.

Which one has the largest volume?
Which one has the smallest volume?

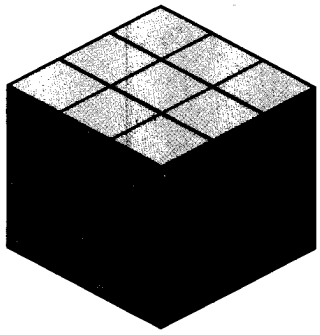
Let's Try .. Volume of Cuboids and Cubes

1. The following solids are made up of 1-cm cubes. Calculate their volumes.

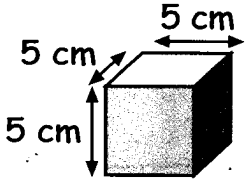
(a)

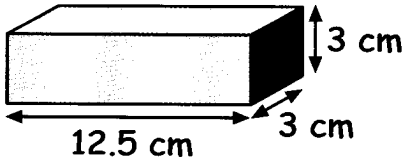


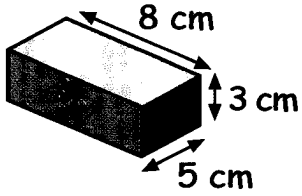
(b)



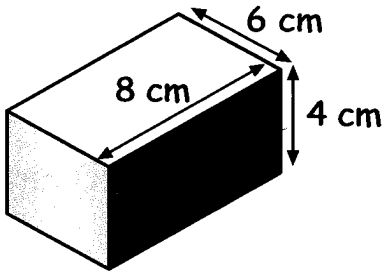
2. Find the volume of each of the following solids.







3. Margaret is cutting a block of cheese into smaller cubes measuring 1 cm by 1 cm by 1 cm. How many unit cubes of cheese can she cut from the large block?

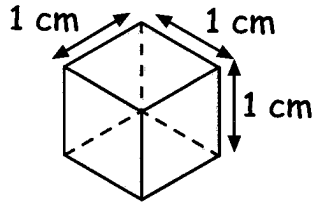


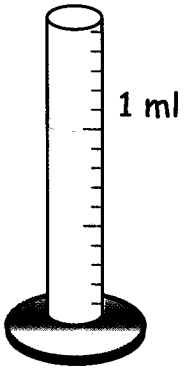
Let's Learn .. Volume of Liquid

Fill a container which is in the shape of a cube of side 1 cm completely with water.
Volume of water in the container = 1 cm^3

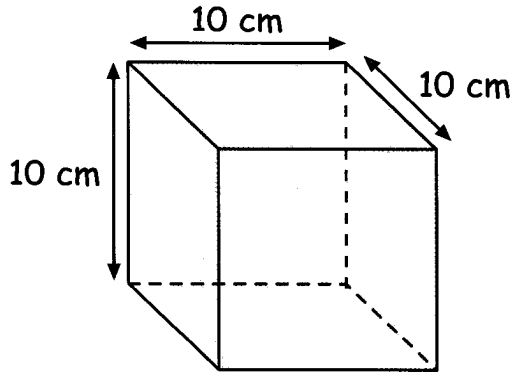
Pour the water into a measuring cylinder.
The measuring cyclinder reads 1 ml.

Volume of water in the cube = volume of water in the measuring cylinder

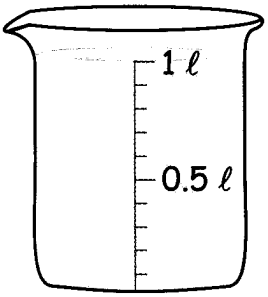




$1\ cm^3 = 1\ ml$



$10 \times 10 \times 10 = 1000\ cm^3$



1 litre

The cubic container measures 10 cm by 10 cm by 10 cm.
The volume of water in it is 1000 cm^3.

$1000\ cm^3 = 1000\ ml = 1\ \ell$

1. Express the following volumes in cm^3.

(a) 5 ℓ = ____ cm^3

(b) 2200 ml = ____ cm^3

(c) 4500 ml = ____ cm^3

(d) 600 ml = ____ cm^3

2. Express the following volumes in ℓ and ml.

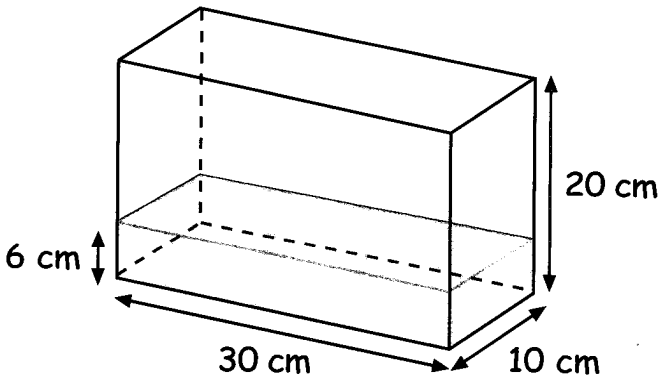
(a) 1850 cm^3 = ____ ml

(b) 8000 cm^3 = ____ ℓ

(c) 2500 cm^3 = ____ ml

(d) 15 000 cm^3 = ____ ℓ

3. Let's find the capacity of the fish tank and the volume of water in the fish tank.

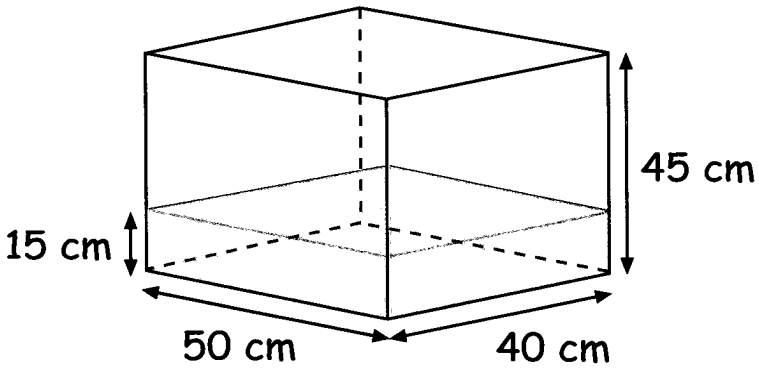


Capacity of the tank
= 30 x 10 x 20
= 6000 cm^3

Volume of water
= 30 x 10 x 6
= 1800 cm^3

The capacity of the fish tank is 6000 cm^3.
It contains 1800 cm^3 of water.

4. A rectangular tank is 50 cm long, 40 cm wide and 45 cm high. The height of the water level in the container is 15 cm. How many more litres of water are required to fill up the tank completely?



$1\ \ell = 1000$ ml

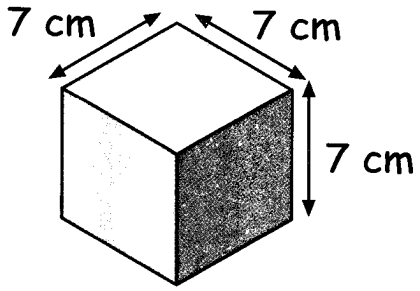
Capacity of the tank = 50 x 40 x 45
= 90 000 cm^3
= 90 000 ml
= 90 ℓ

Volume of water in the tank = 50 x 40 x 15
= 30 000 cm^3
= 30 000 ml
= 30 ℓ

Amount of water required to fill up the tank completely
= 90 - 30
= 60 ℓ

60 ℓ more water are required to fill up the tank completely.

5. Find the volume of the solid below in ℓ.



Volume = $l \times l \times l$

= ☐ × ☐ × ☐

= ☐ cm^3

= ☐ ℓ

6. A water tank measures 80 m by 10 m by 3 m. Find the volume of water in the tank when the water level is 1 m below the top of the tank.

Volume of water in the tank = $l \times b \times h$

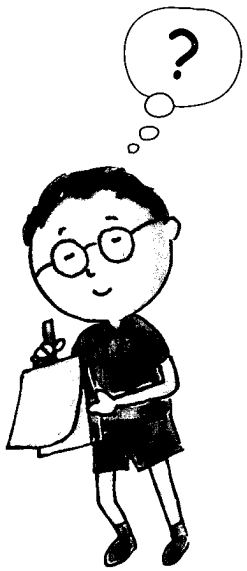
l = ☐ m

b = ☐ m

h = ☐ m - ☐ m = ☐ m

Volume = ☐ × ☐ × ☐

= ☐ m^3



Let's Try .. Volume of Liquid

1. Express the following in ℓ and ml.

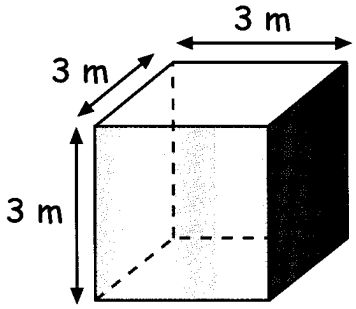
   (a) 3000 cm^3 (b) 5575 cm^3 (c) 20 025 cm^3

2. Express the following in cm^3.

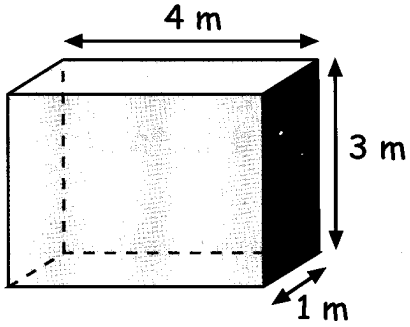
   (a) 750 ml (b) 3.07 ℓ (c) 5.12 ℓ

3. Find the capacity of each of the following containers and express it in cubic metres.

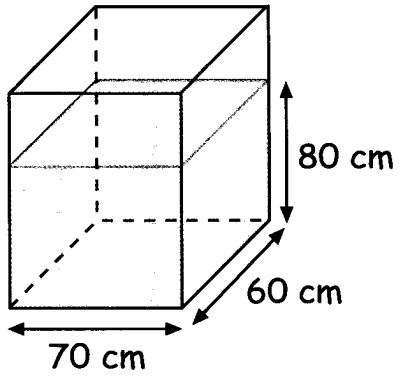
   (a)



   (b)



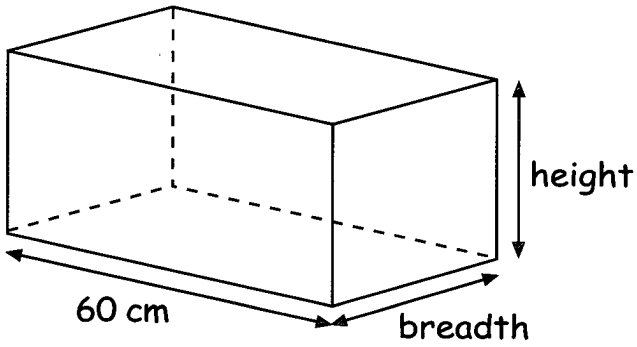
4. Find the volume of water in the rectangular tank in ℓ.



5. A rectangular carton measures 5 cm by 10 cm by 25 cm. It contains 1 ℓ of milk. How much empty space is there in the carton? Express your answer in cm^3.

Let's Learn .. Word Problems

1. The length of a fish tank is 60 cm. Its breadth is half of its length and its height is as long as its breadth. Find the capacity of the fish tank in litres.



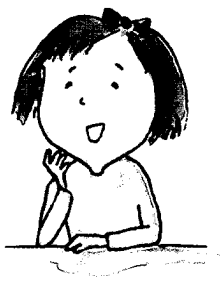
1 ℓ = 1000 ml

Length = 60 cm

Breadth = Height = $\frac{1}{2}$ x 60
= 30 cm

Capacity = 60 x 30 x 30
= 54 000 cm^3
= 54 ℓ

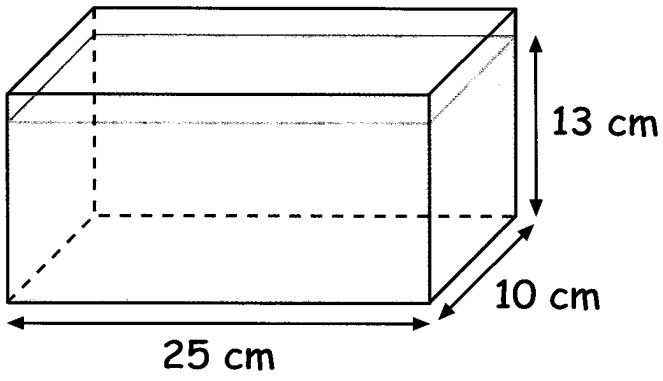
The capacity of the fish tank is 54 ℓ.

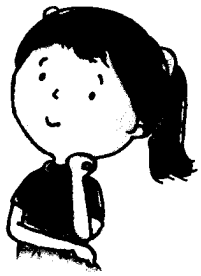


2. A rectangular tank is 25 cm long and 10 cm wide.
The height of the water level is 13 cm.

$\frac{5}{6}$ of a rectangular tank has been filled with water.

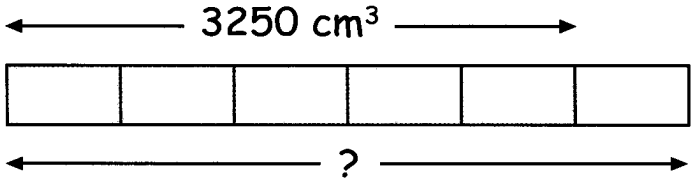
What is the capacity of the tank?





Length = 25 cm
Breadth = 10 cm
Height of the water level = 13 cm

Volume of water in the tank = 25 x 10 x 13
= 3250 cm^3



5 units ⟶ 3250

1 unit ⟶ $\frac{3250}{5}$ = 650

6 units ⟶ 650 x 6 = 3900

The capacity of the tank is 3900 cm^3.

3. A water tank measures 50 m by 20 m by 2 m. It is filled with water to $\frac{3}{4}$ of its capacity. How much more water is needed to fill the tank to its full capacity?

The capacity of the tank = $l \times b \times h$

= ☐ × ☐ × ☐

= ☐ m^3

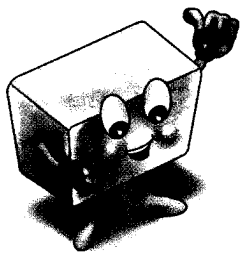
$1 - \frac{3}{4} = \frac{1}{4}$

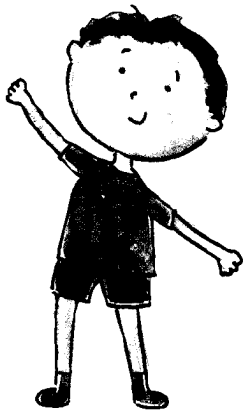
$\frac{1}{4}$ of the tank is not filled with water.

Volume of water needed to fill the tank to its full capacity

= ☐ × ☐ m^3

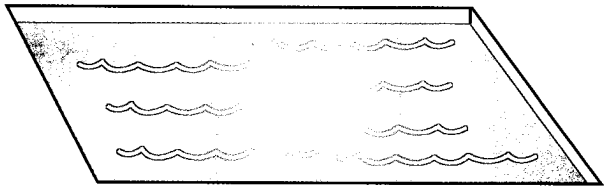
= ☐ m^3



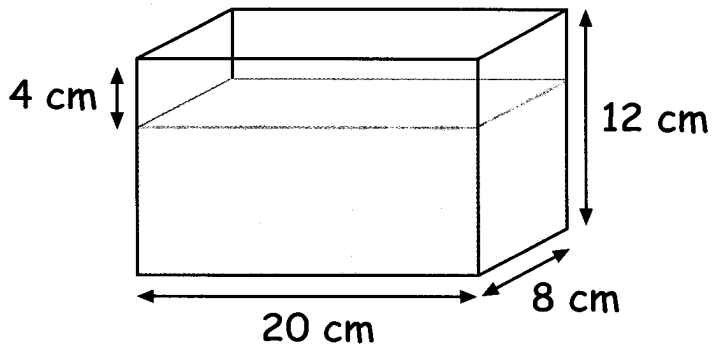


Let's Try .. Word Problems

1. A water tank, 50 m long, 20 m wide and 3 m deep, is completely filled with water. What is the volume of water in the tank?



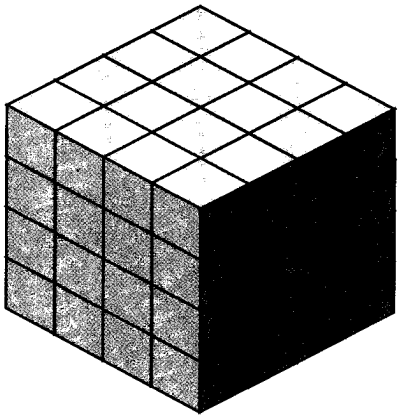
2. A fish tank measuring 20 cm by 8 cm by 12 cm is shown below.
   (a) Find the capacity of the tank in ml.
   (b) Find the volume of water in the tank if the surface of the water is 4 cm from the top of the tank.

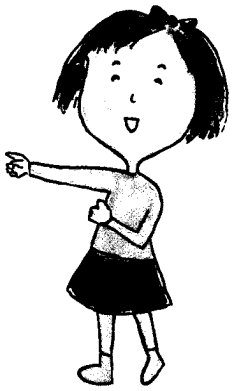


3. Ann makes chocolate balls for her birthday party. She has 10 chocolate bars each measuring 15 cm by 8 cm by 2 cm. She melts all of them and pours the chocolate into some moulds to make chocolate balls. The capacity of each mould is 8 ml. How many chocolate balls has she made?

The 6 faces of a wooden cube with length 4 cm is painted purple.

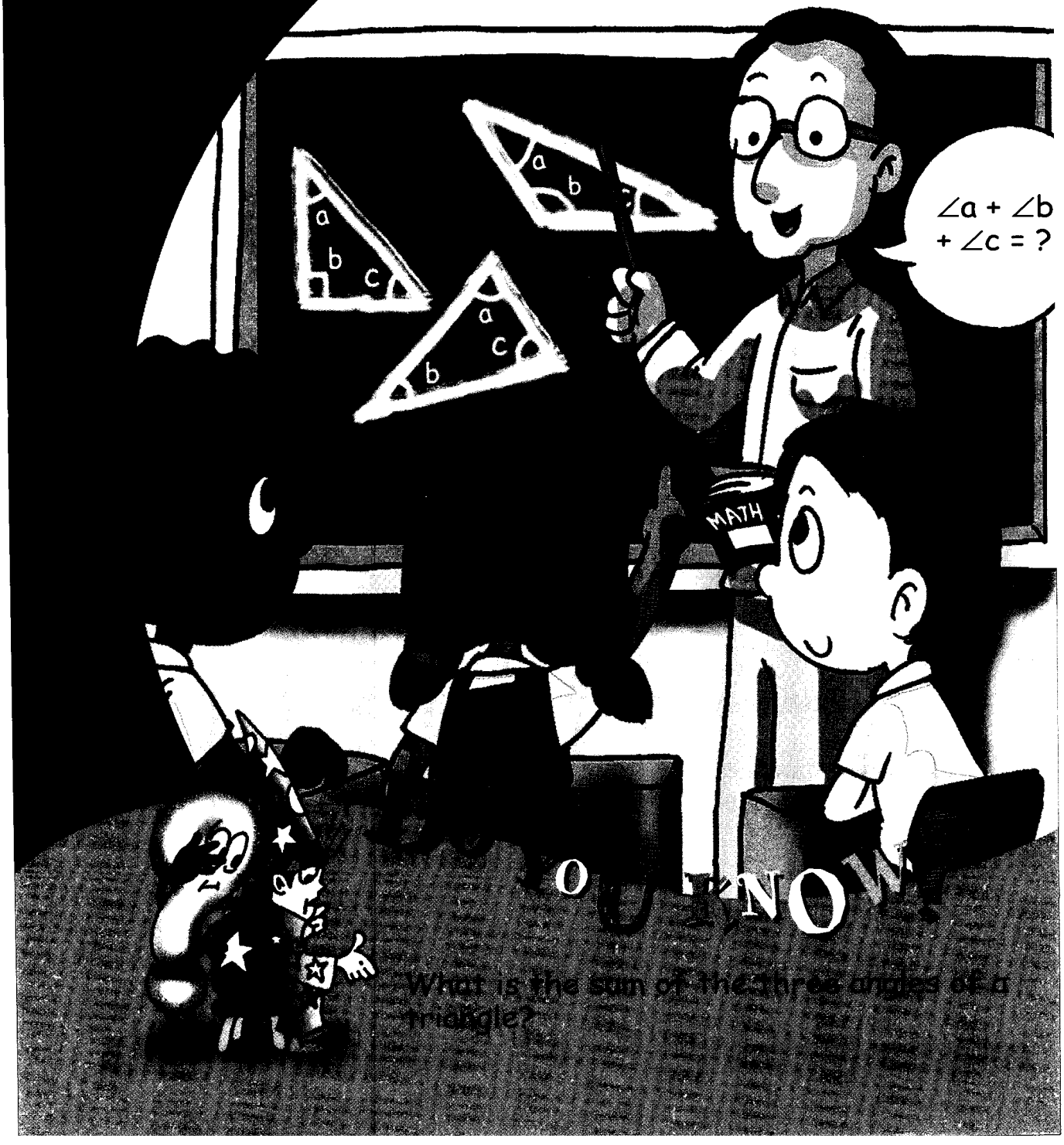
Now cut it into unit cubes as shown.





1. How many cubes have only one purple face?
2. How many cubes have two purple faces?
3. How many cubes have three purple faces?
4. How many cubes have no purple face?

12 Triangles

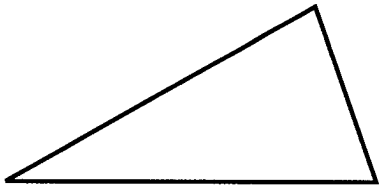


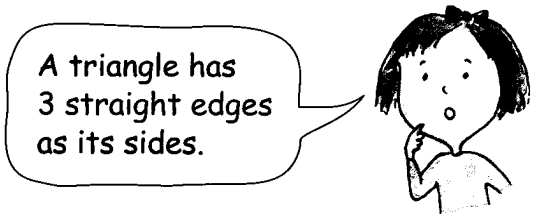
YOU KNOW!

What is the sum of the three angles of a triangle?

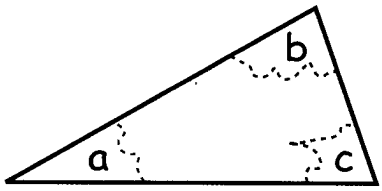
Let's Learn .. Sum of Angles of a Triangle

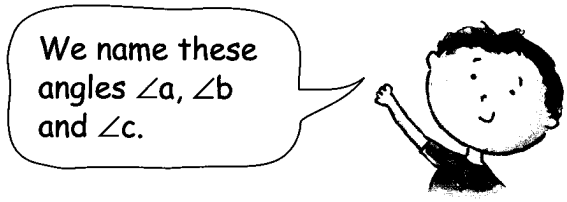
Draw a triangle on a piece of paper and cut it out along its edges.



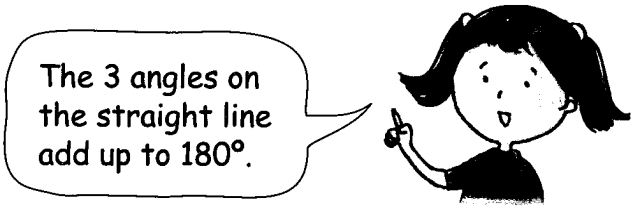


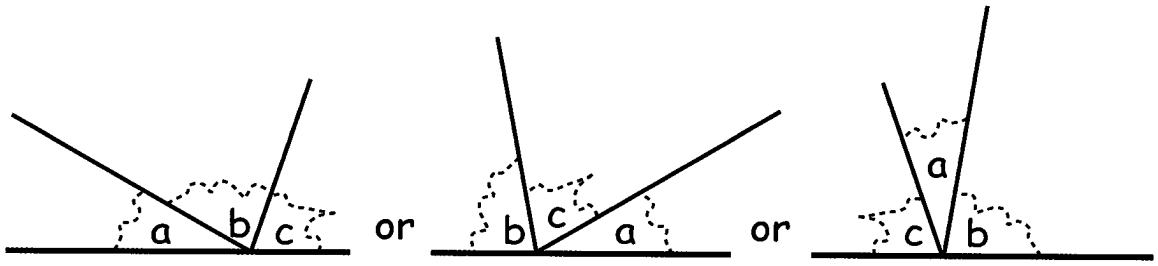
Tear off each of the 3 corners of the triangle as shown below.



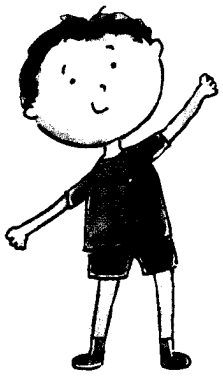


Next, draw a straight line using a ruler and lay out the angles along the line.





The three angles of a triangle add up to 180°.

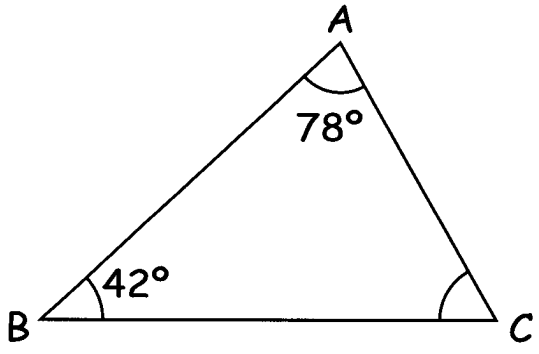


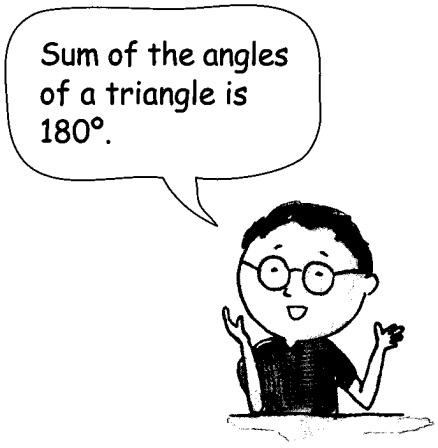
Work in pairs.
Draw a triangle on a piece of paper. Then use a protractor to measure each of its three angles. Add them and see if the sum is 180°.

Repeat by drawing 3 more triangles of different sizes.

All triangles in the following questions are not drawn to scale.

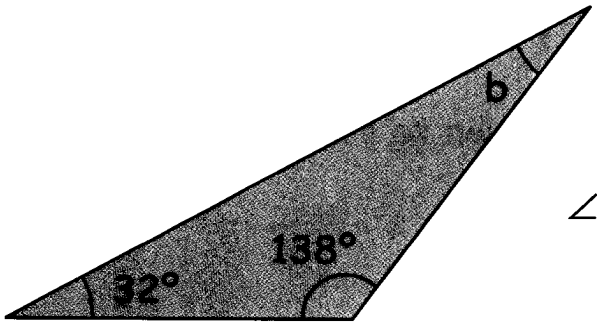
1. In triangle ABC, $\angle ABC = 42°$ and $\angle CAB = 78°$. What is $\angle BCA$?





$\angle BCA = 180° - 42° - 78°$
$= 60°$

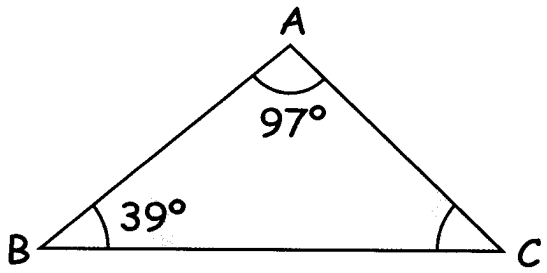
2. Find the unknown marked angle.



$\angle b = 180° - 32° - 138°$
$= 10°$

3. Find the unknown angle in each triangle.

(a)

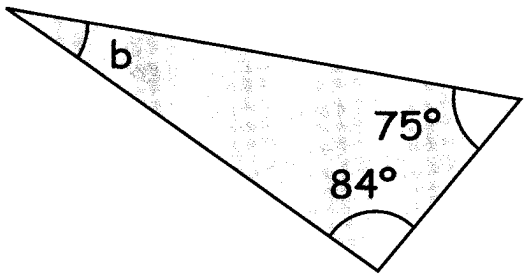


$\angle ACB = 180° - \angle BAC - \angle ABC$

$= 180° - \square - \square$

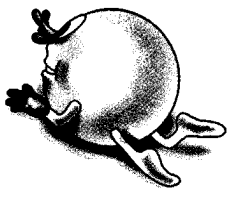
$= \square$

(b)



$\angle b = \square - \square - \square$

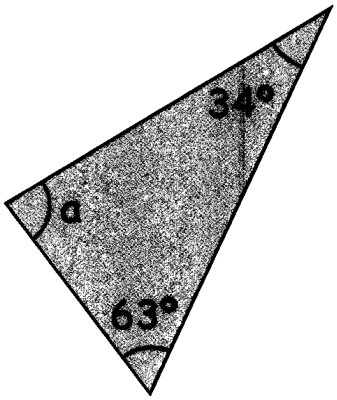
$= \square$



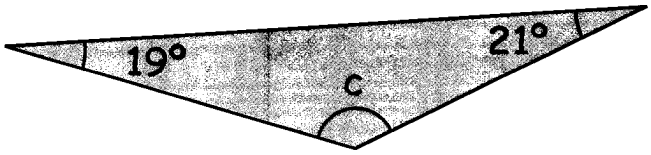
Let's Try .. Sum of Angles of a Triangle

The following figures are not drawn to scale.
Find the unknown marked angles.

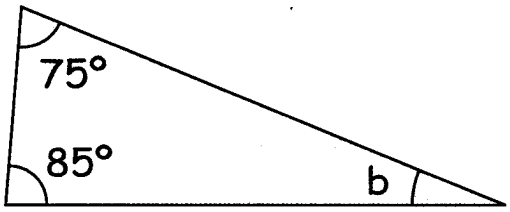
(a)



(b)

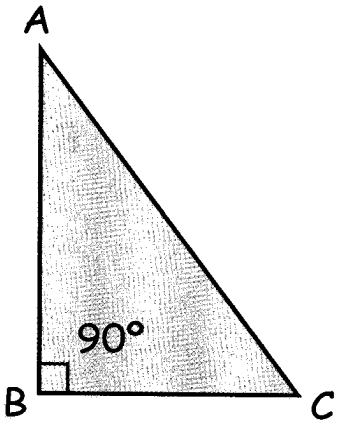


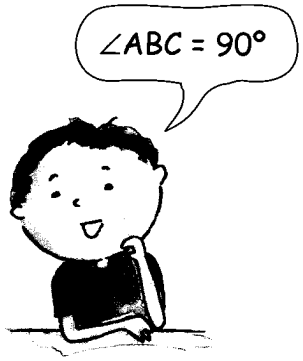
(c)



Let's Learn .. Special Triangles

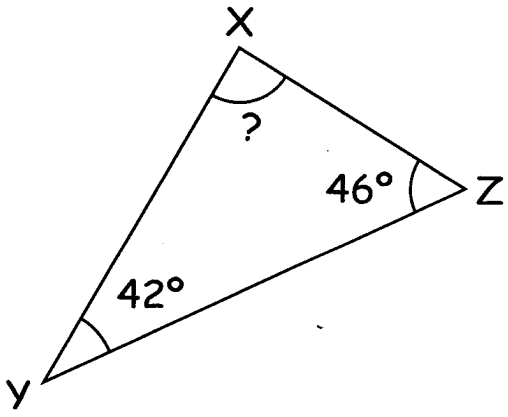
Right-angled Triangle





The triangle ABC has a right angle. It is a right-angled triangle.

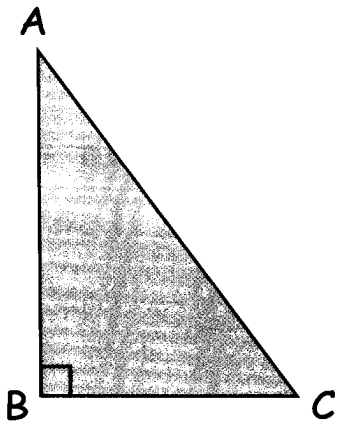
1. Is triangle XYZ a right-angled triangle?



Unknown angle = 180° - 42° - 46°
= 92°

Since no angle of the triangle is equal to 90°, triangle XYZ is not a right-angled triangle.

In the right-angled triangle ABC,
$\angle ABC = 90°$

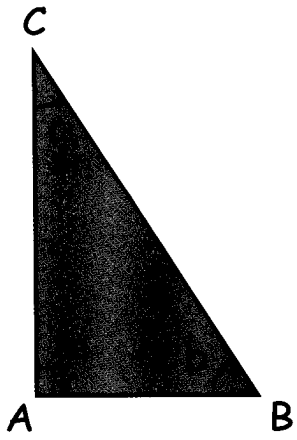


Then $\angle A + \angle C + 90° = 180°$

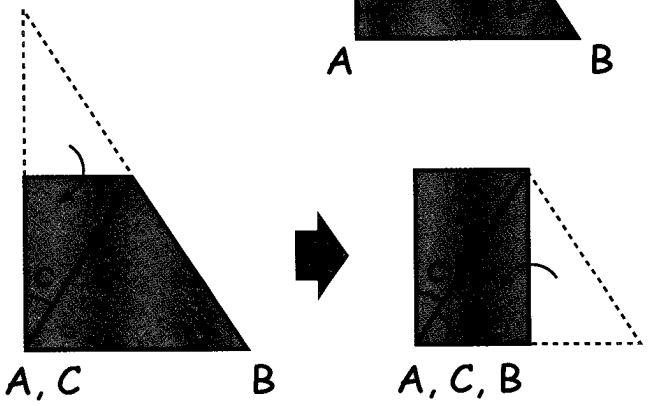
$$\angle A + \angle C = 180° - 90°$$
$$= 90°$$

When an angle of a triangle is a right angle, the other 2 angles add up to 90°.

Copy and cut out the right-angled triangle on the right. Label the angles as shown.



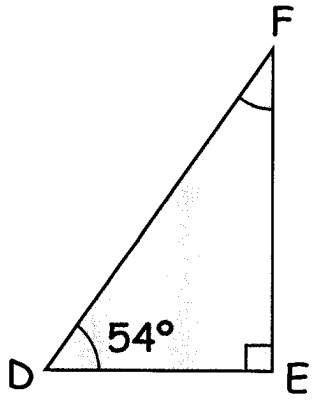
Fold $\angle c$ and $\angle b$ in towards the right angle, $\angle a$.



What can you say about $\angle a$, $\angle b$ and $\angle c$?

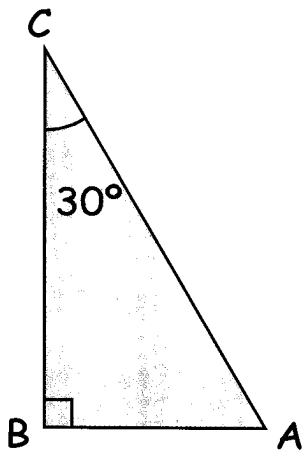
Triangles in the following questions are not drawn to scale.

2. In the right-angled triangle DEF, $\angle EDF = 54°$. What is $\angle DFE$?



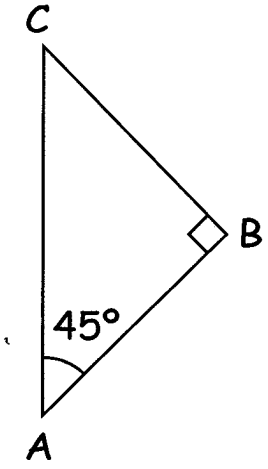
$\angle DFE = 90° - 54°$
$= 36°$

3. In the right-angled triangle ABC, $\angle ACB = 30°$. What is $\angle CAB$?



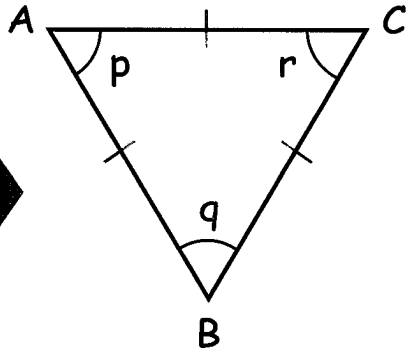
$\angle CAB = 90° - \square$
$= \square$

4. In the right-angled triangle ABC, $\angle BAC = 45°$. What is $\angle BCA$?



$\angle BCA = \square - \square$
$= \square$

Equilateral Triangle



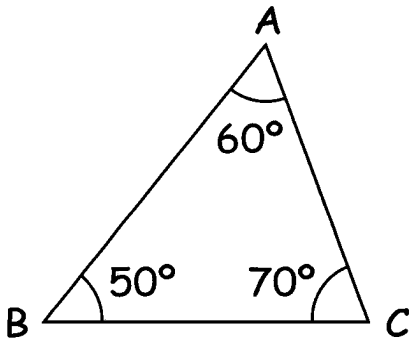
Triangle ABC has 3 equal sides; it is an equilateral triangle.

Use a ruler and protractor to measure the angles of triangle ABC. What can you say about all its angles?

$\angle p = \angle q = \angle r = 60°$

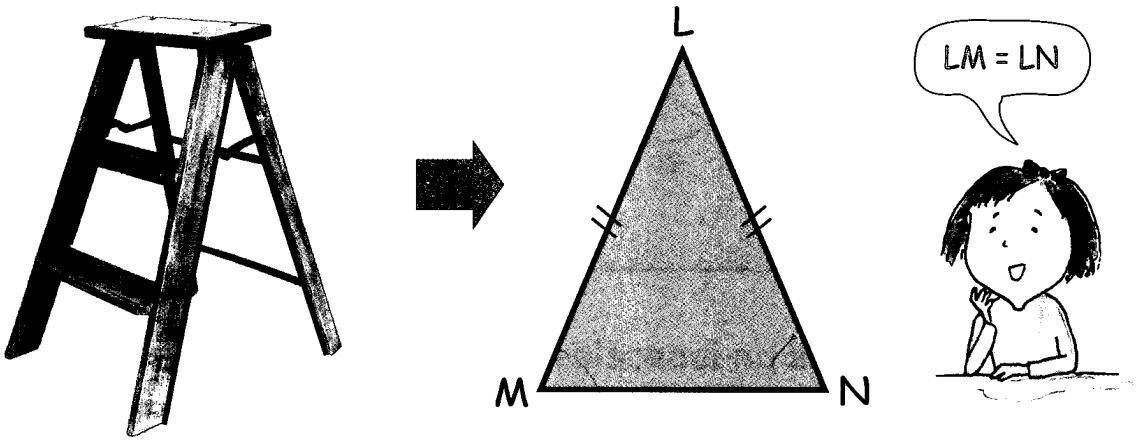
An equilateral triangle has 3 equal angles. Each angle is 60°.

5. Is triangle ABC an equilateral triangle?



In triangle ABC, $\angle ABC$ and $\angle ACB$ are not equal to 60°. So, it is not an equilateral triangle.

Isosceles Triangle

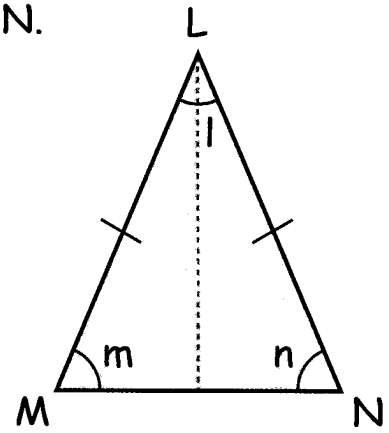


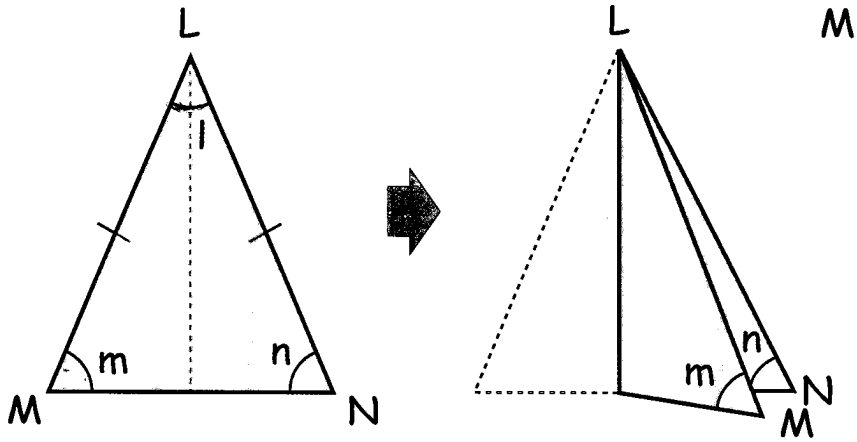
Triangle LMN has 2 equal sides; it is an isosceles triangle.

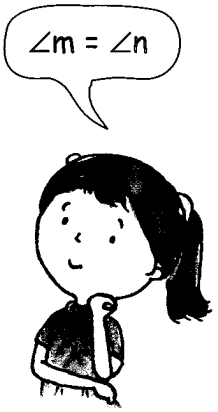
Copy and cut out the isosceles triangle LMN.
Label the angle as shown .

Fold the isosceles triangle in half along the dotted line as shown.

What do you notice?



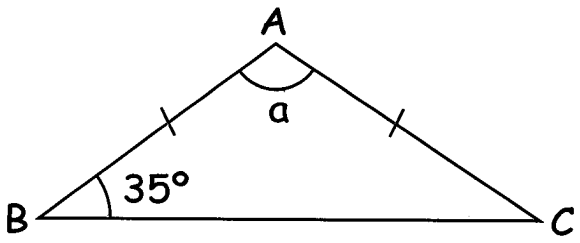




An isosceles triangle has 2 equal angles.

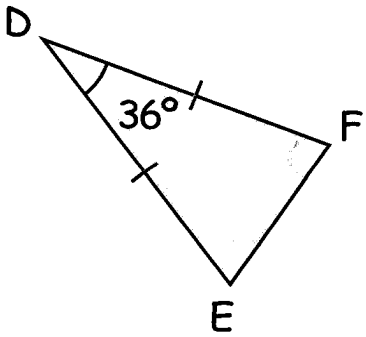
All triangles in the following questions are not drawn to scale.

1. Triangle ABC is an isosceles triangle. Find the marked unknown angle.



Triangle ABC is an isosceles triangle.
$\angle ACB = \angle ABC = 35°$
$\angle a = 180° - 35° - 35°$
$= 110°$

2. Triangle DEF is an isosceles triangle. Find $\angle DEF$.



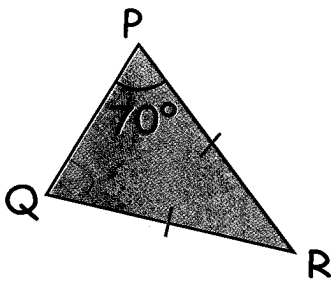
Triangle DEF is an isosceles triangle.
$\angle DFE = \angle DEF$

$\angle DFE + \angle DEF = 180° - 36°$
$= 144°$

$\angle DEF = \frac{1}{2} \times 144°$

$= 72°$

3. Triangle RPQ is an isosceles triangle. Find $\angle PRQ$.



Since triangle RPQ is an isosceles triangle, $\angle PQR = \angle RPQ =$ ☐

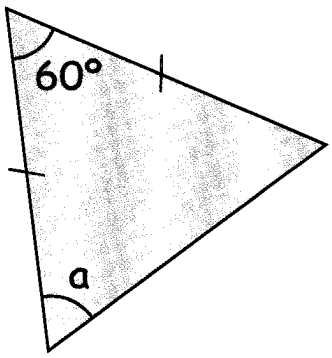
$\angle PRQ = 180° -$ ☐ $-$ ☐

$=$ ☐

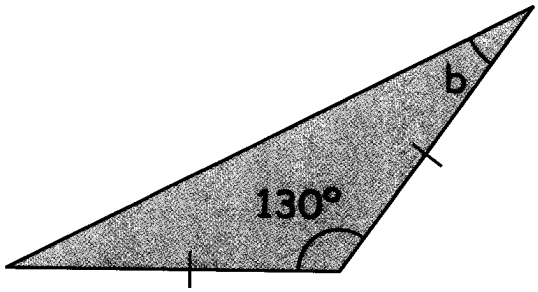
Let's Try .. Special Triangles

The following isosceles triangles are **not** drawn to scale.
Find the unknown marked angles.

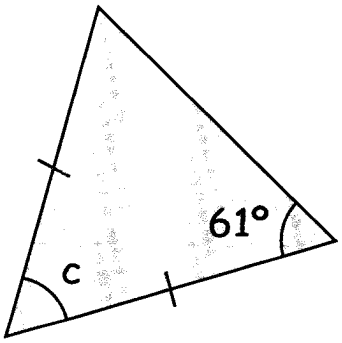
(a)



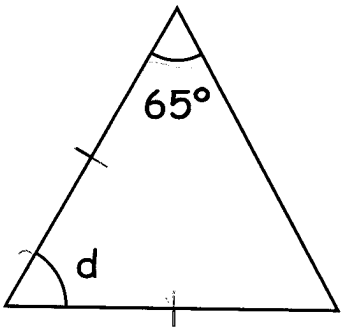
(b)



(c)

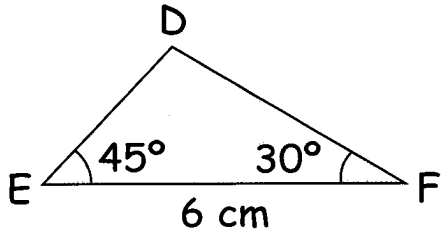


(d)

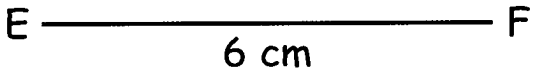


Constructing Triangles

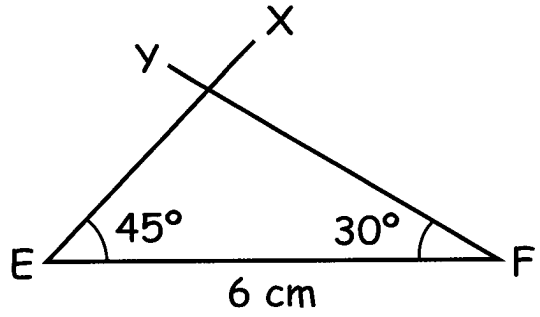
Draw triangle DEF with ∠DEF = 45°, ∠EFD = 30° and EF = 6 cm.



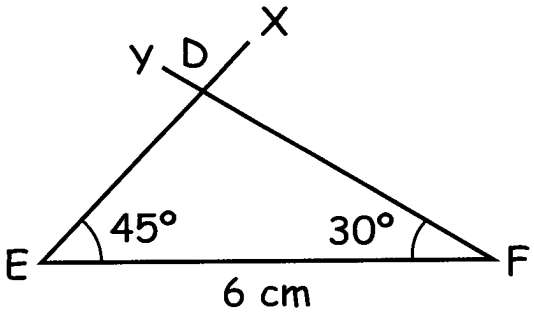
STEP 1 Draw a line of 6 cm and name it EF.



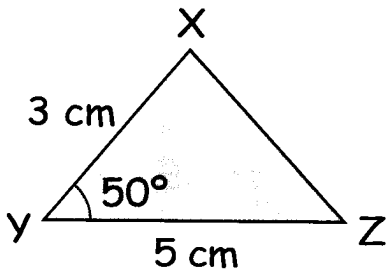
STEP 2 Use a protractor to draw ∠XEF = 45° and ∠YFE = 30° on the same side of EF.



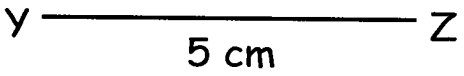
STEP 3 Mark the point of intersection of EX and FY as D to get triangle DEF.



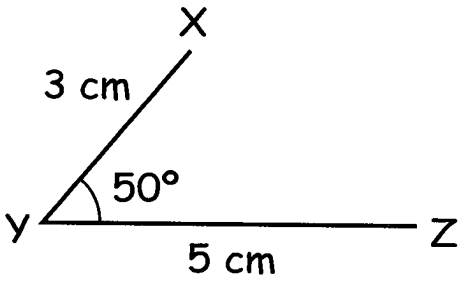
Draw triangle XYZ in which YZ = 5 cm, XY = 3 cm and $\angle XYZ = 50°$.



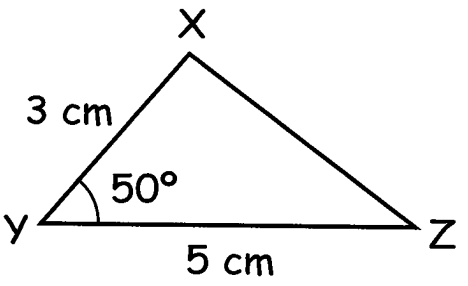
STEP 1 Draw a line of 5 cm and name it YZ.



STEP 2 Use a protractor to draw an angle of 50° at Y and draw line XY = 3 cm.

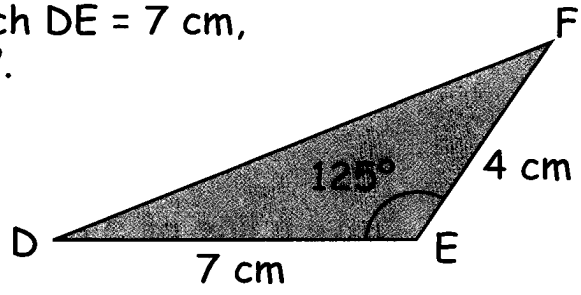


STEP 3 Join X to Z to form triangle XYZ.

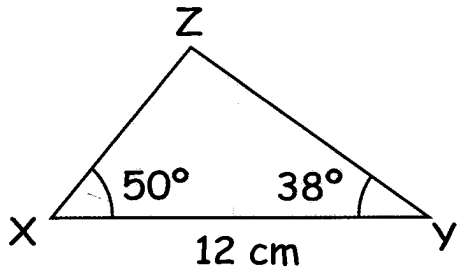


Let's Try .. Constructing Triangles

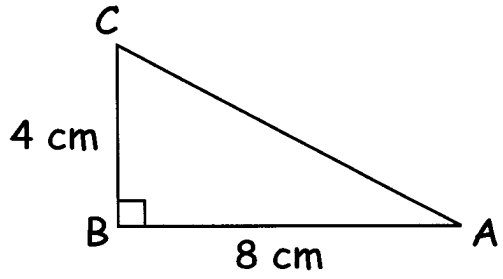
1. Draw a triangle DEF in which DE = 7 cm, EF = 4 cm and ∠DEF = 125°.



2. Draw a triangle XYZ in which XY = 12 cm, ∠ZXY = 50° and ∠XYZ = 38°.



3. Draw a right-angled triangle ABC in which AB = 8 cm, BC = 4 cm and ∠ABC = 90°.



The figure below is made up of matchsticks of equal length. How many equilateral triangles can you find in the figure?

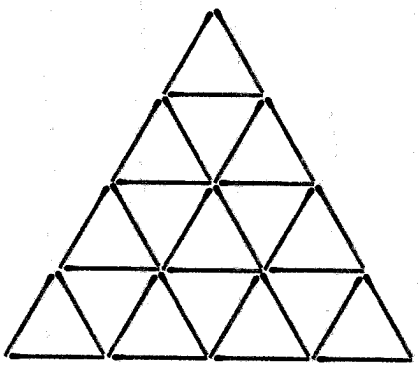
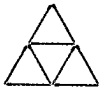
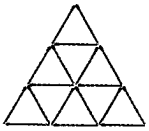
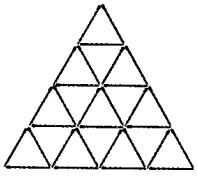
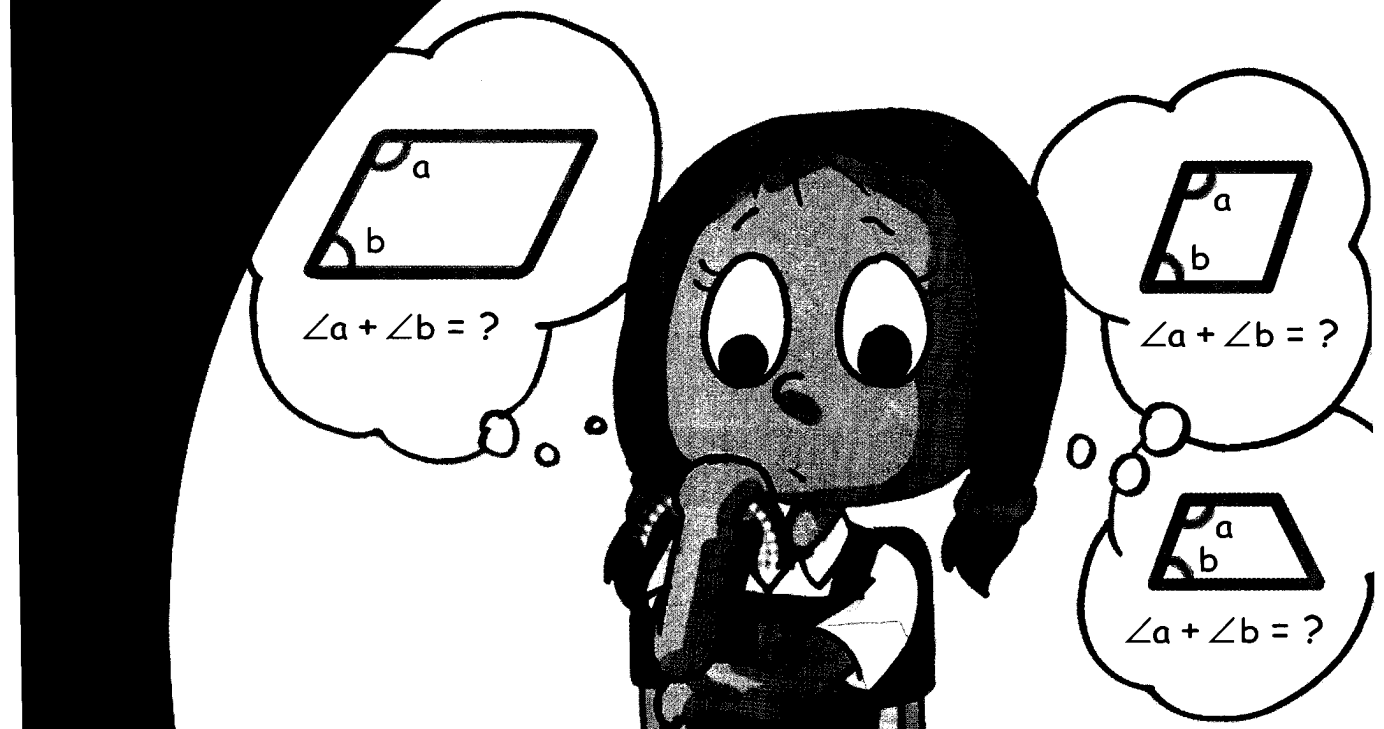


Figure	Number of such triangles
	
	
	
	
	Total number of triangles =

13 4-sided Figures



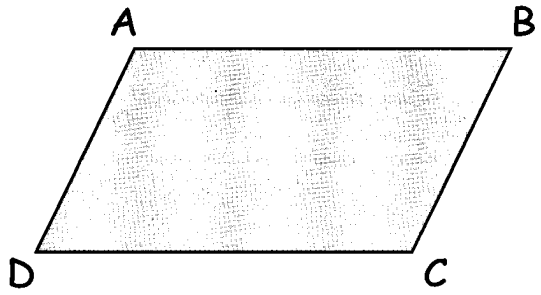
Do You Know?

What is the sum of the angles in each figure above?

Let's Learn .. Identifying 4-sided Figures

Parallelogram, Rhombus and Trapezium

Look at the figure ABCD.



It has 4 sides.

Measure the length of each side.

AB = 5 cm, DC = 5 cm
AD = 3 cm, BC = 3 cm

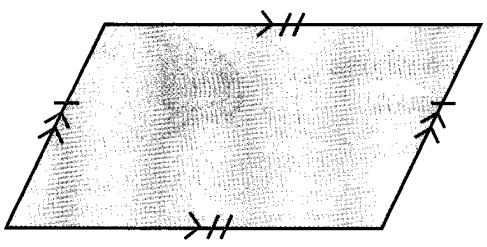
Check if the two pairs of opposite sides are parallel using a ruler and a set square.

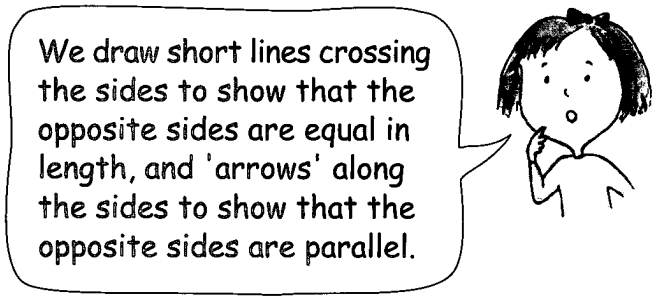
We have,

AD // BC
AB // DC

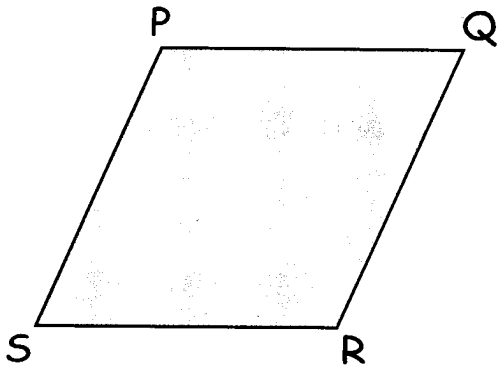
Figure ABCD is called a parallelogram.

A parallelogram has 4 sides. The opposite sides are parallel and equal in length.





Look at the figure PQRS.



It has 4 sides.

Measure the length of each side.

PQ = 4 cm, QR = 4 cm
RS = 4 cm, SP = 4 cm

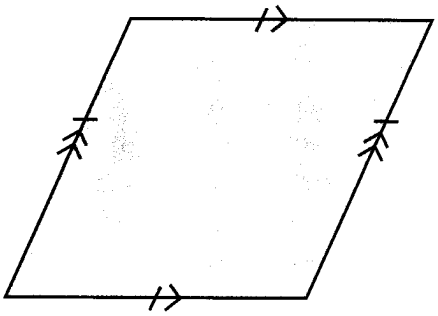
Check if the two pairs of opposite sides are parallel using a ruler and a set square.

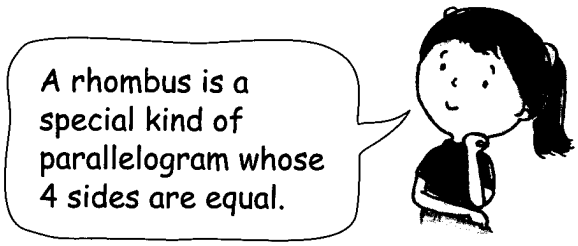
We have,

PS // QR
PQ // SR

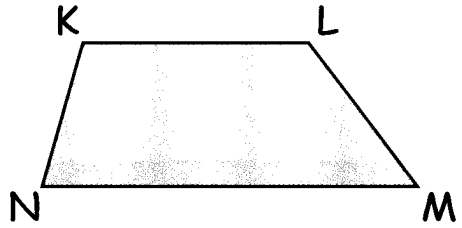
Figure PQRS is called a rhombus.

A rhombus has 4 sides. All the 4 sides are equal.
The two pairs of opposite sides are parallel.





Look at the figure KLMN.



It has 4 sides.

Measure the length of each side.

KL = ☐ cm, LM = ☐ cm

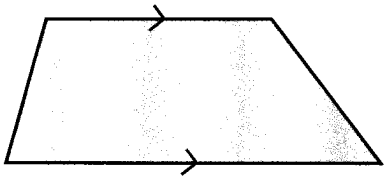
NM = ☐ cm, KN = ☐ cm

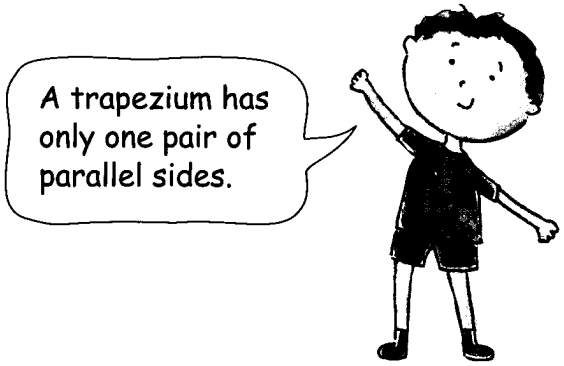
Check if the two pairs of opposite sides are parallel using a ruler and a set square.

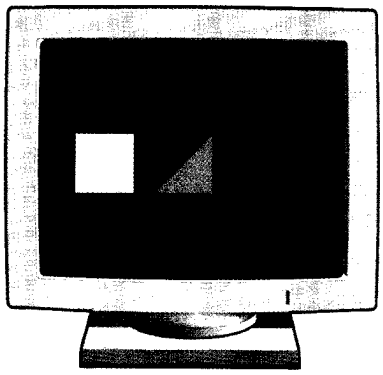
We have,
KL // NM
But KN is not parallel to LM.

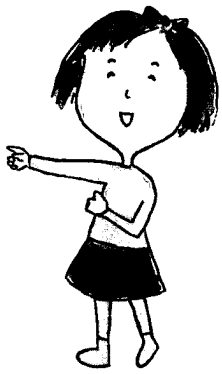
Figure KLMN is called a trapezium.

A trapezium has 4 sides, only one pair of opposite sides are parallel.



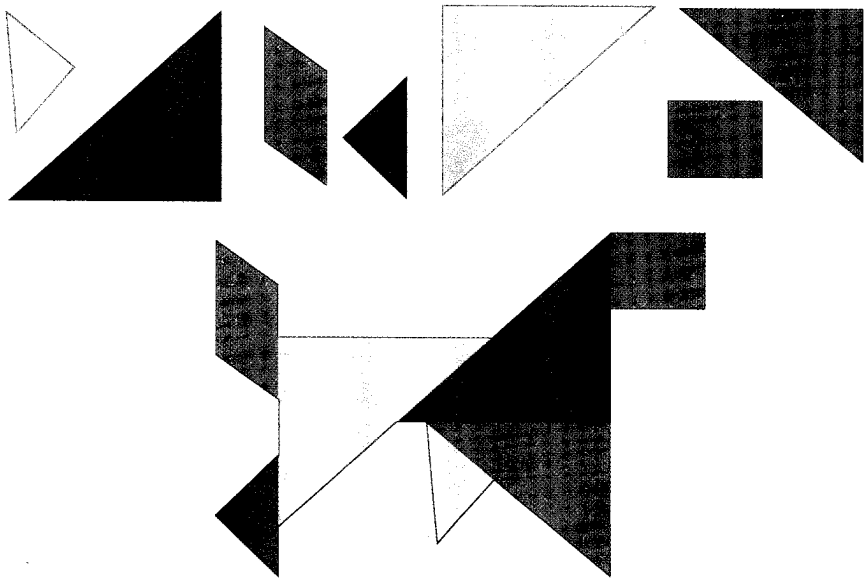






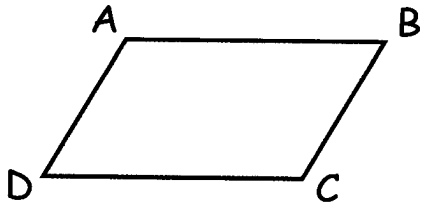
Using a computer software (e.g. Microsoft Word), draw the shapes shown in different colours and then form them into the shape of a dog.

Identify each shape used. You may also try to form other shapes.



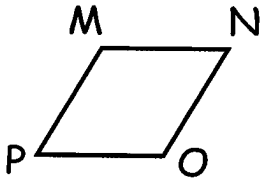
Identifying 4-sided Figures

1. ABCD is a parallelogram.



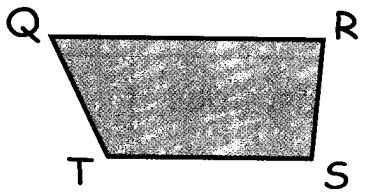
(a) How many sides does it have?
(b) How many pairs of parallel lines does it have?
(c) How many pairs of its sides are equal?
(d) Which sides are equal?

2. MNOP is a rhombus.



(a) How many sides does it have?
(b) How many pairs of parallel lines does it have?
(c) How many sides are equal?
(d) Which sides are parallel?

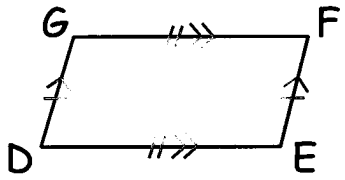
3. QRST is a trapezium.



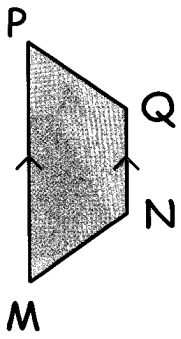
(a) How many sides does it have?
(b) How many pairs of parallel lines does it have?
(c) How many sides are equal?

4. Study the figures below. Copy and complete the following table. Identify the figures as parallelogram, rhombus or trapezium.

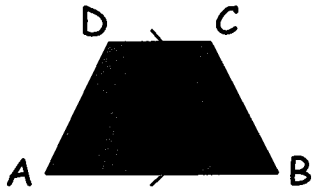
(a)



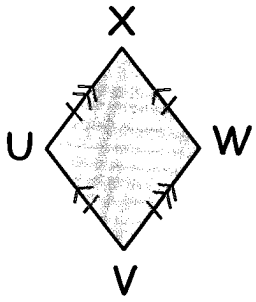
(b)



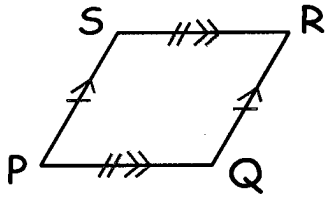
(c)



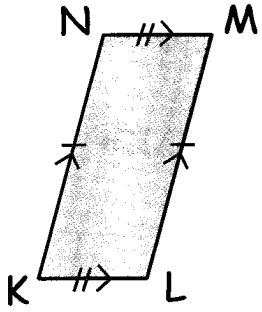
(d)



(e)



(f)

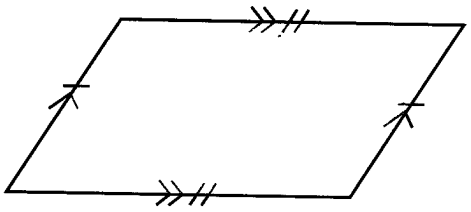


Property	Which Figure?	Name of the Figures
Opposite sides are parallel and all sides are equal		
Opposite sides are parallel and equal		
Only 1 pair of opposite sides are parallel		

Let's Learn .. Properties of 4-sided Figures

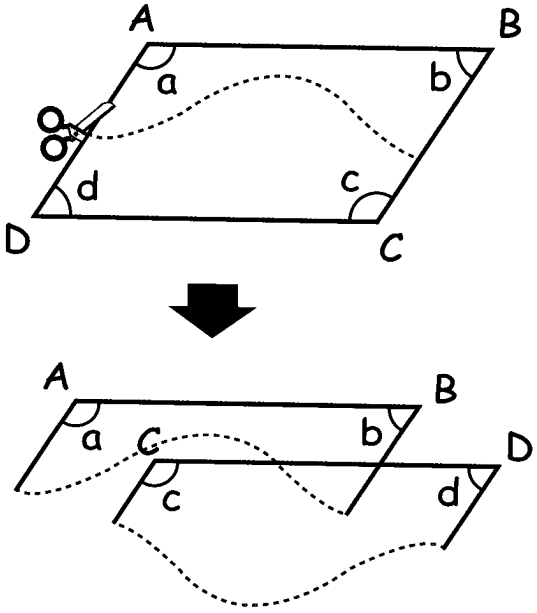
Parallelogram

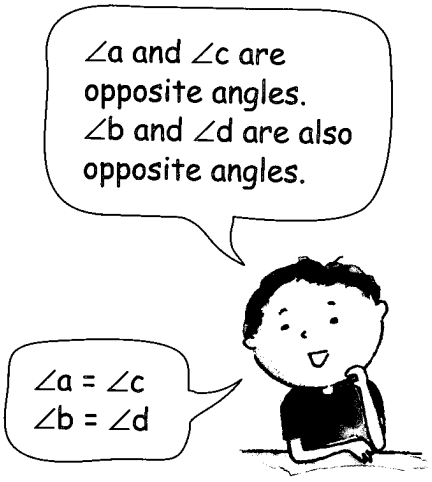
Below is a parallelogram.



Copy the parallelogram on a piece of paper and cut it out. Label all the angles in the parallelogram as shown below.

Try to match the angles by cutting the parallelogram into 2 pieces as shown.

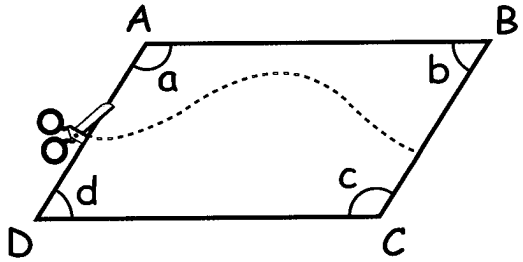


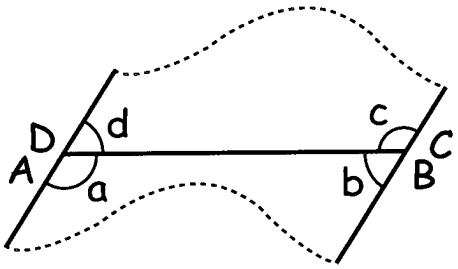


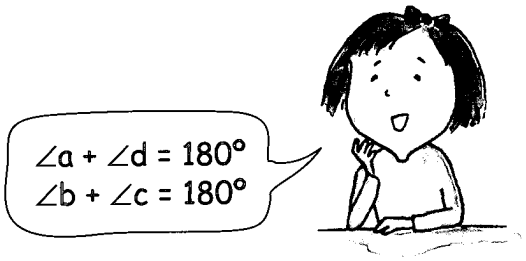
What do you notice about the opposite angles of a parallelogram?

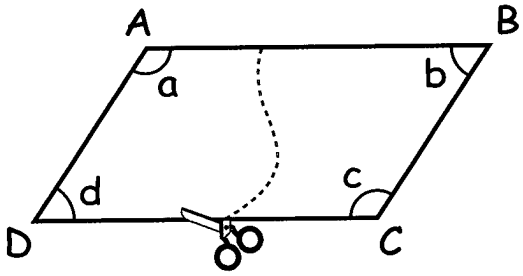
The opposite angles of a parallelogram are equal.

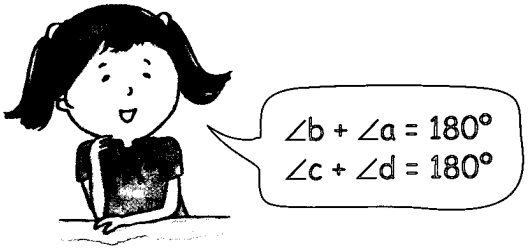
Copy and cut out another 2 parallelograms as shown below.

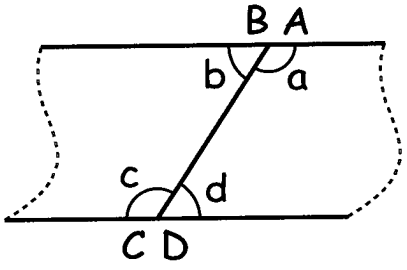










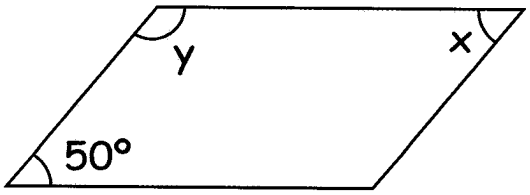


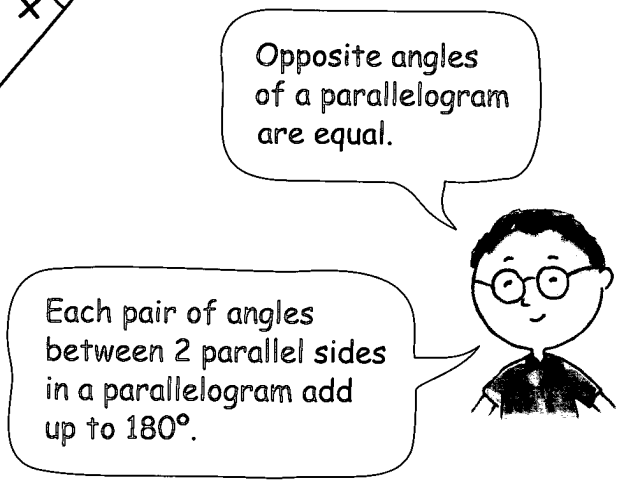
What do you notice about the angles again?

Each pair of angles between 2 parallel sides add up to 180°.

The figures in the following questions are not drawn to scale.

1. Find the unknown angles in the parallelogram.

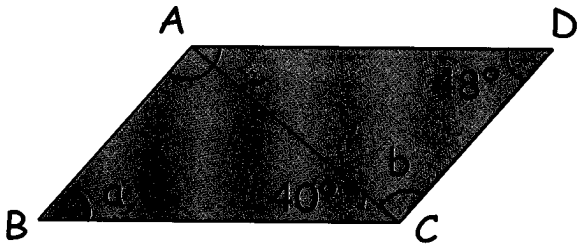


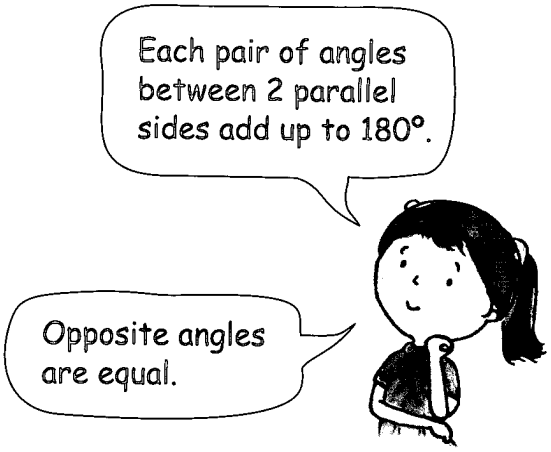


$\angle x = 50°$

$\angle y = 180° - 50°$
$= 130°$

2. Find $\angle a$ and $\angle b$ in the parallelogram below.



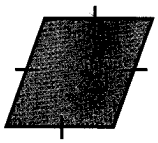


$\angle a =$ ☐

$\angle DCB = 180° -$ ☐
$=$ ☐

$\angle b =$ ☐ $- 40°$
$=$ ☐

Rhombus

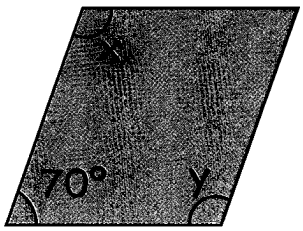


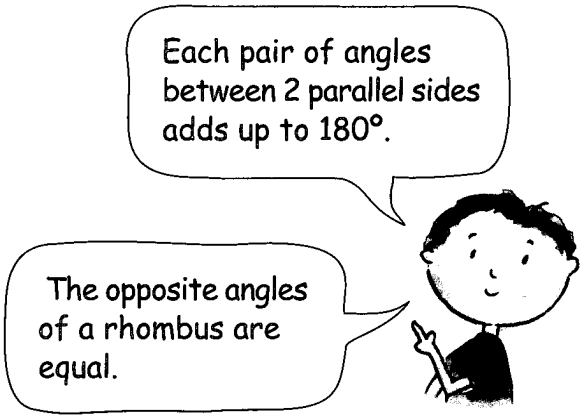
A rhombus is a special parallelogram. The properties of parallelogram are also true for rhombus. So we have

The opposite angles of a rhombus are equal.

Each pair of angles between 2 parallel sides adds up to 180°.

3. Find the unknown marked angles in the rhombus.

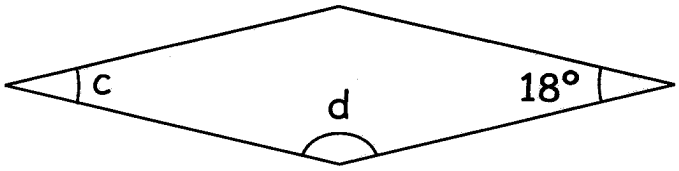


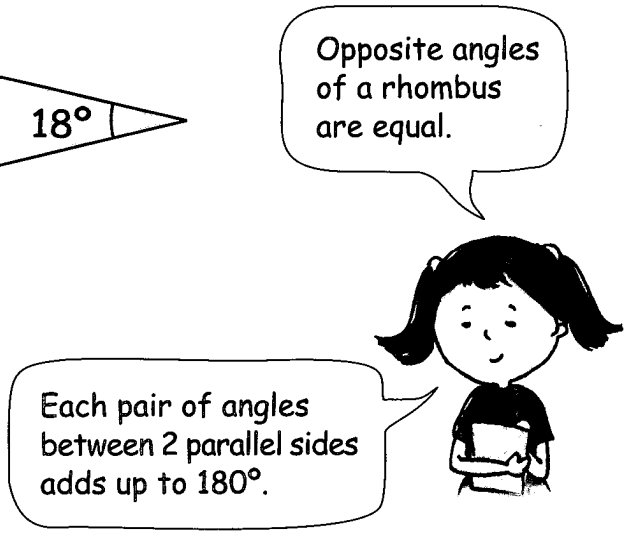


$\angle x = 180° - 70°$
$= 110°$

$\angle y = 110°$

4. Find $\angle c$ and $\angle d$ in the rhombus below.





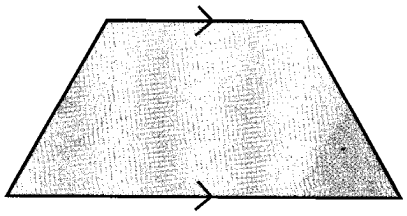
$\angle c =$ ☐

$\angle d =$ ☐ − ☐

$=$ ☐

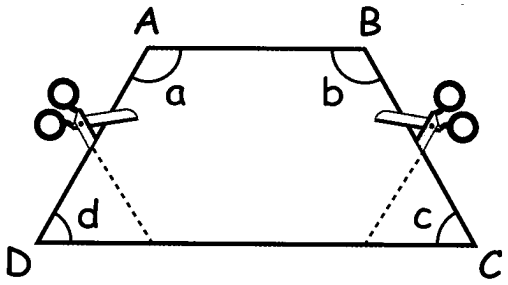
Trapezium

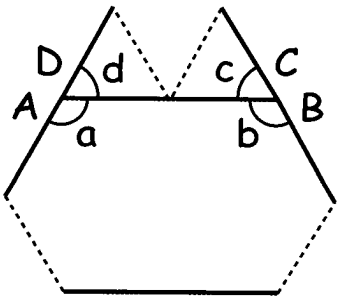
Below is a trapezium.

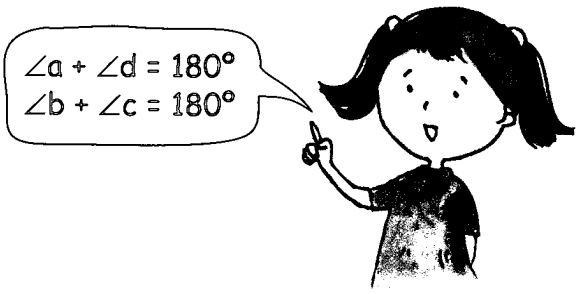


Copy the trapezium on a piece of paper and cut it out.
Label all the angles in the trapezium as shown below.

Try to match the angles by cutting the trapezium as shown.



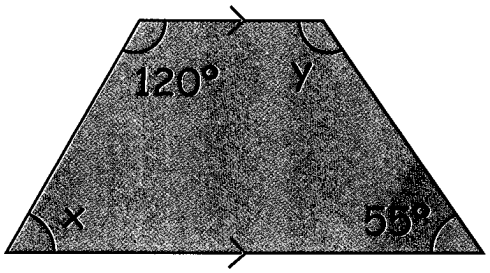


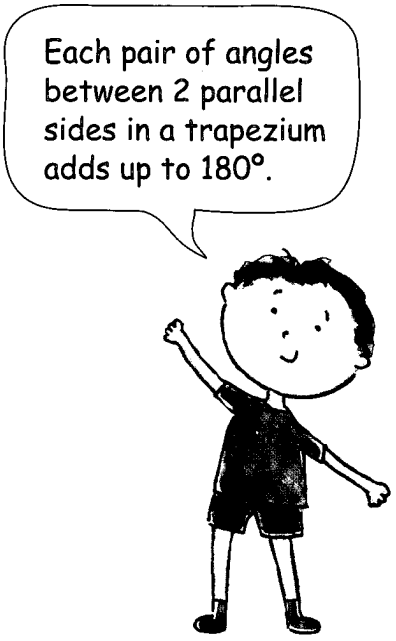


What do you notice about the angles in the trapezium?

Each pair of angles between 2 parallel sides of a trapezium adds up to 180°.

5. Find the unknown angles in the trapezium.

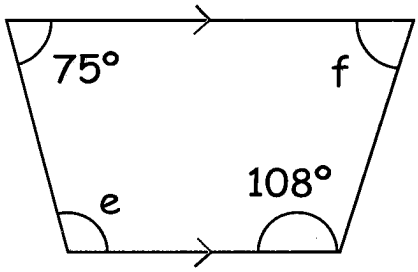




$\angle x = 180° - 120°$
$= 60°$

$\angle y = 180° - 55°$
$= 125°$

6. Find $\angle e$ and $\angle f$ in the trapezium below.



$\angle e =$ ☐ $-$ ☐

$=$ ☐

$\angle f =$ ☐ $-$ ☐

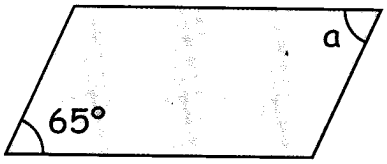
$=$ ☐

Let's Try .. Properties of 4-sided Figures

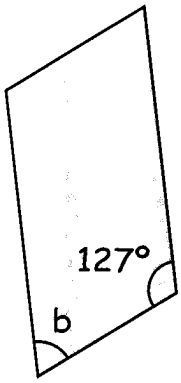
The figures in the following questions are not drawn to scale.

1. Find the unknown angle in each parallelogram.

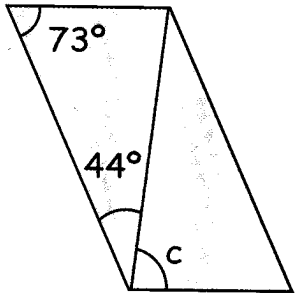
(a)



(b)

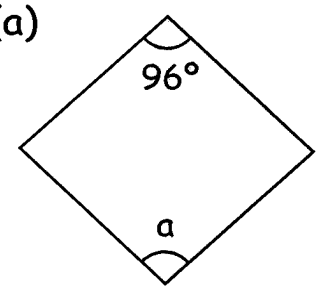


(c)

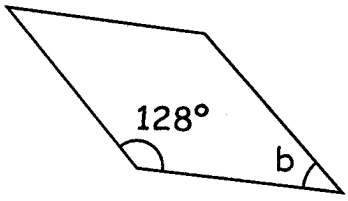


2. Find the unknown angle in each rhombus.

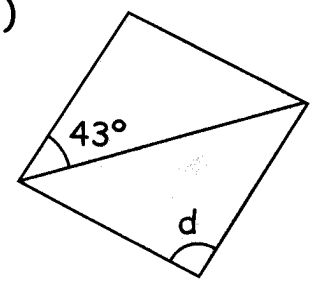
(a)



(b)

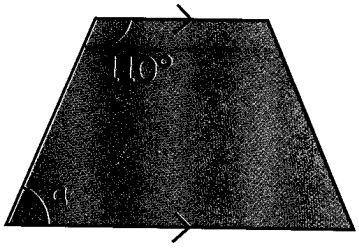


(c)

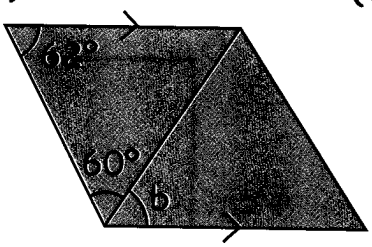


3. Find the unknown angle in each trapezium.

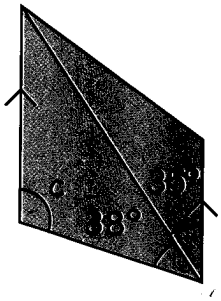
(a)



(b)



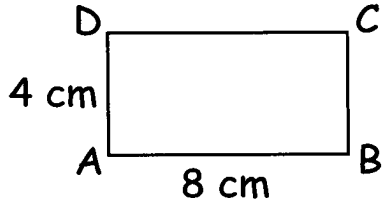
(c)



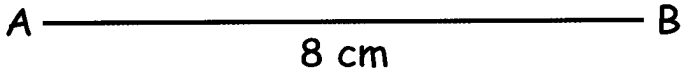
Let's Learn .. Construction of 4-sided Figures

We can construct various 4-sided figures using a ruler, a protractor and a set-square.

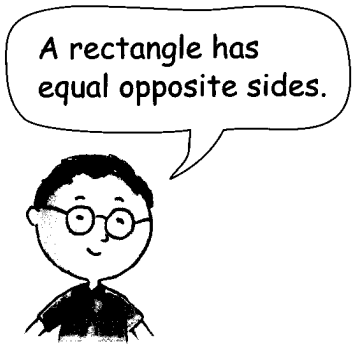
1. Draw a rectangle ABCD in which AB = 8 cm and AD = 4 cm.

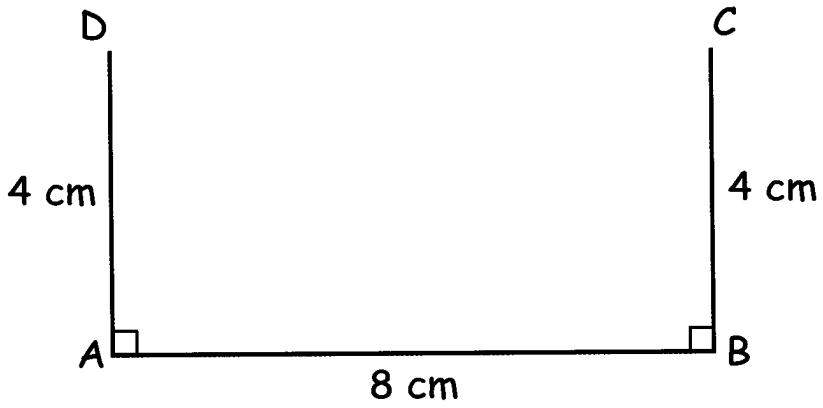


STEP 1 Using a ruler, measure and draw a line of 8 cm. Name it AB.

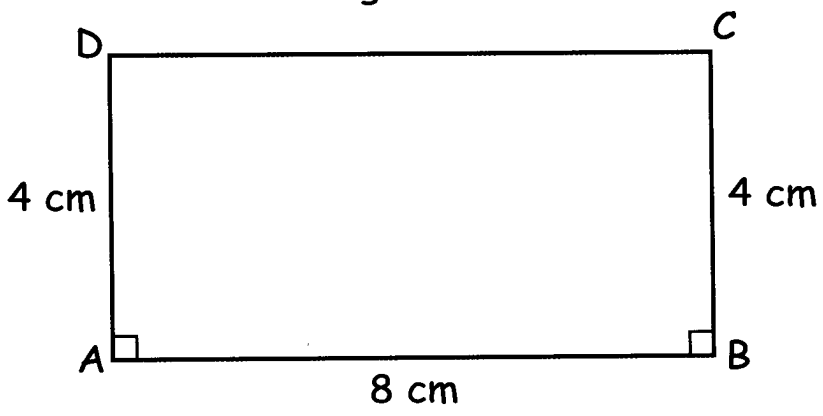


STEP 2 Using a protractor, draw perpendicular lines to AB through A and B respectively. Using a ruler, mark AD = 4 cm and BC = 4 cm.

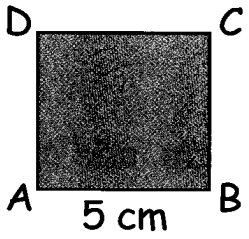




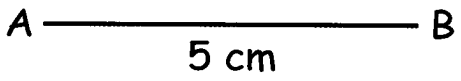
STEP 3 Join D to C to form a rectangle.



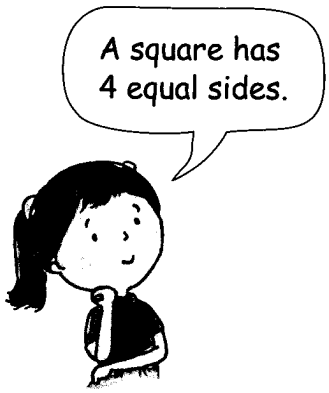
2. Draw a square ABCD with side 5 cm.

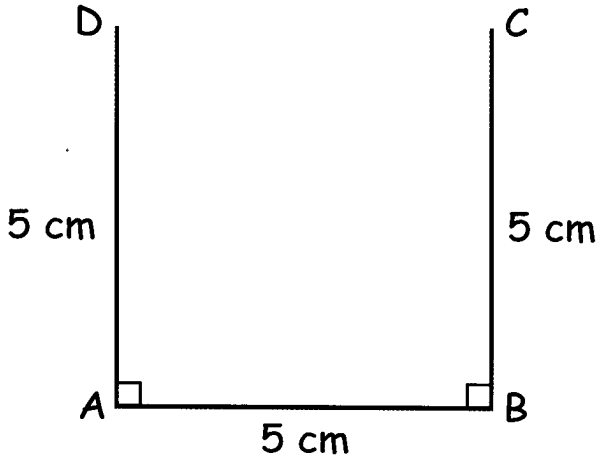


STEP 1 Draw a line of 5 cm and name it AB.

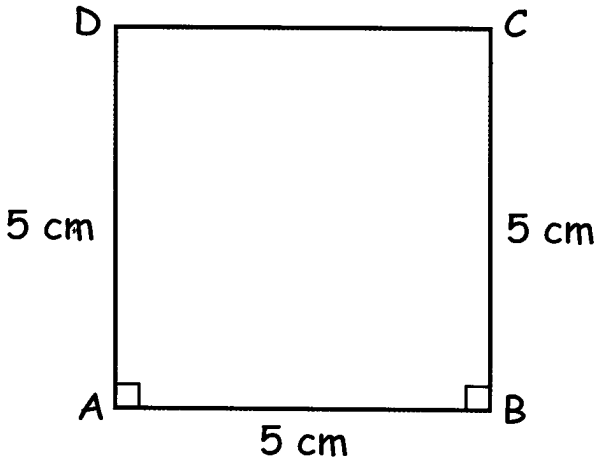


STEP 2 Draw perpendicular lines to AB through A and B respectively. Mark out AD = 5 cm and BC = 5 cm.

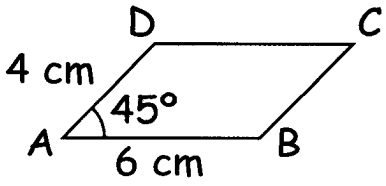




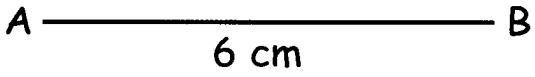
STEP 3 Join D to C to form a square.



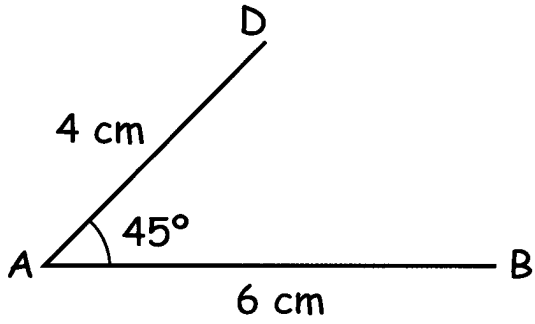
3. Draw a parallelogram ABCD in which AB = 6 cm , AD = 4 cm and $\angle DAB = 45°$.



STEP 1 Draw a line of 6 cm, and name it AB.

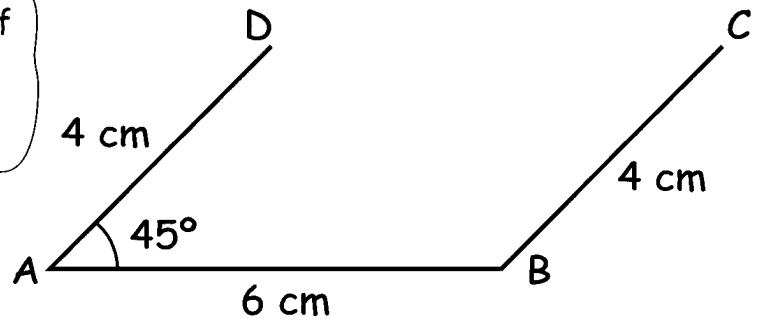


STEP 2 Draw line AD such that $\angle DAB = 45°$ and AD = 4 cm.

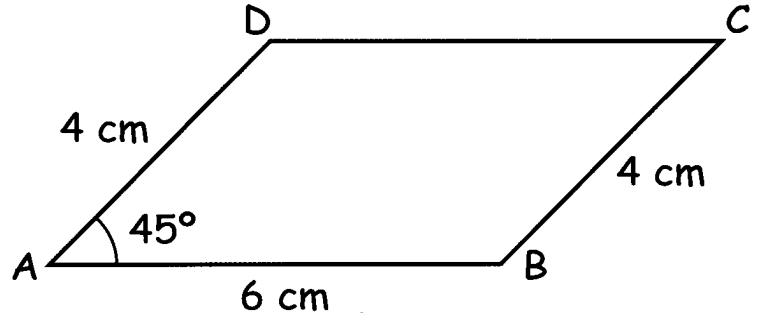


STEP 3 Draw line BC such that BC is parallel to AD and BC = 4 cm.

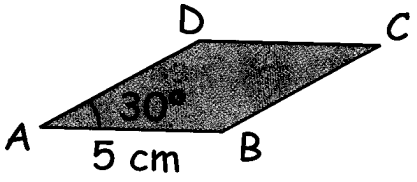
Opposite sides of a parallelogram are parallel and equal.



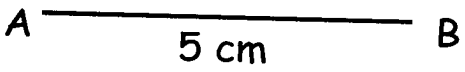
STEP 4 Join D to C to form a parallelogram.



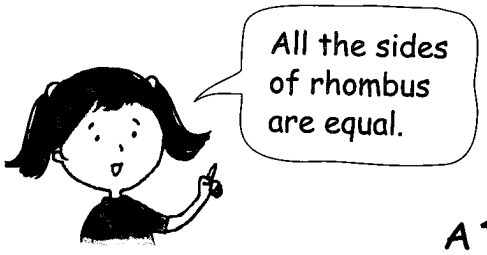
4. Draw a rhombus $ABCD$ in which $AB = 5$ cm and $\angle DAB = 30°$.

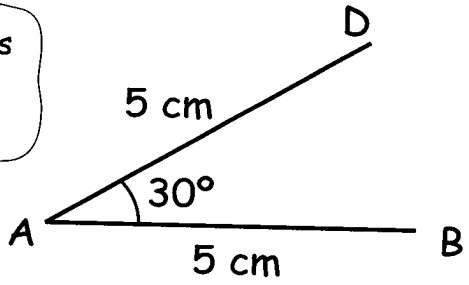


STEP 1 Draw a line of 5 cm and name it AB.

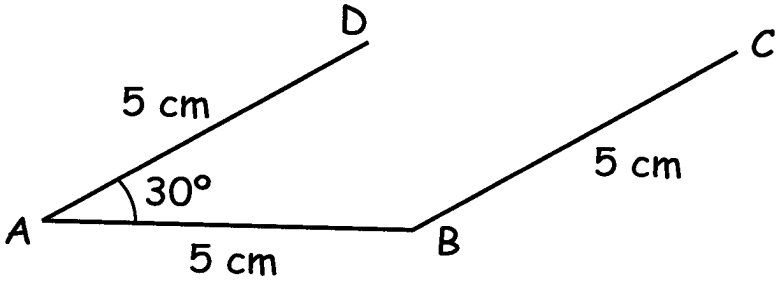


STEP 2 Draw line AD such that $\angle DAB = 30°$ and $AD = 5$ cm.

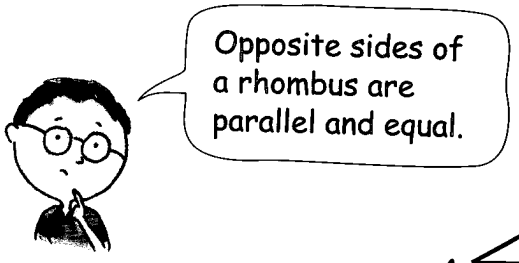


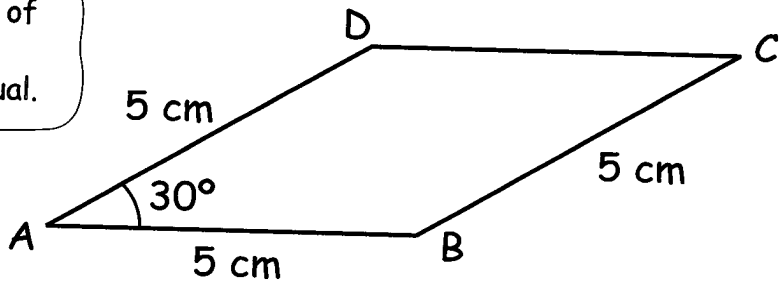


STEP 3 Draw line BC such that BC is parallel to AD and $BC = 5$ cm.

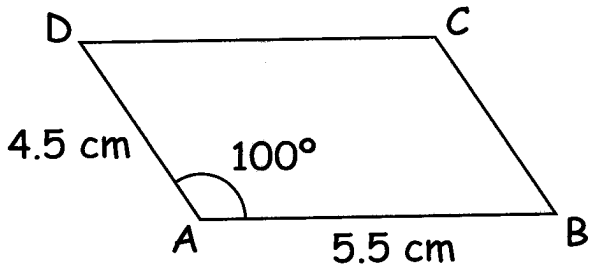


STEP 4 Join D to C to form a rhombus.





5. Construct a parallelogram ABCD in which AB = 5.5 cm , AD = 4.5 cm and $\angle DAB = 100°$.

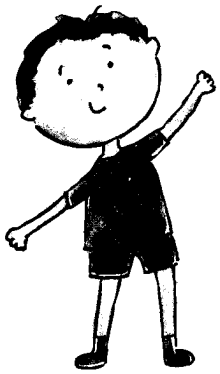


STEP 1 Draw line AB = ☐ cm.

STEP 2 Draw line AD such that $\angle DAB = 100°$ and AD = ☐ cm.

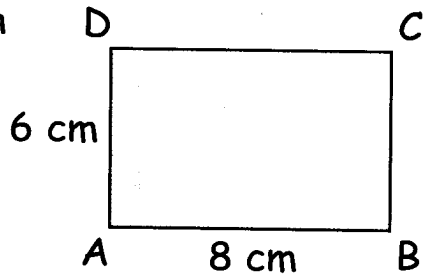
STEP 3 Draw BC such that BC is parallel to AD and BC = ☐ cm.

STEP 4 Join D to C to form a parallelogram.

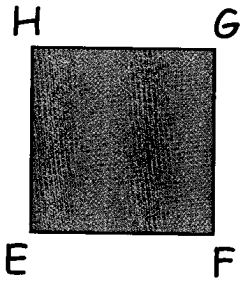


Let's Try .. Construction of 4-sided Figures

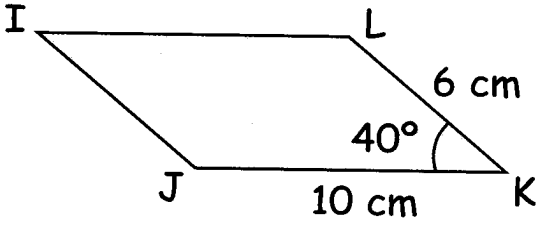
1. Construct a rectangle ABCD in which AB = 8 cm and AD = 6 cm.



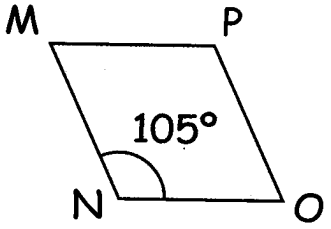
2. Construct a square EFGH with all sides equal to 9 cm.



3. Construct a parallelogram IJKL in which JK = 10 cm, LK = 6 cm and ∠JKL = 40°.



4. Construct a rhombus MNOP in which OP = 6.5 cm and ∠MNO = 105°.



The following is a trangram. Copy the diagram and cut along the dotted lines. Use the shapes obtained to form as many shapes as possible.