New Syllabus

Primary Mathematics

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5A

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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 5A comprises 7 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.

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Whole Numbers

Do You Know?

What is the population of Singapore?

1. The number of residents in Tampines on 31 March 2002 was 217 915.

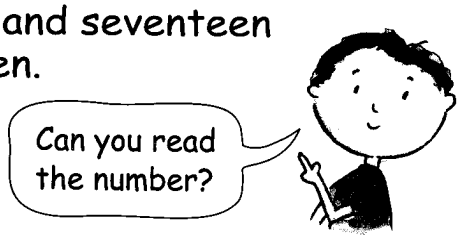
We can represent 217 915 using number discs in a place value chart.

Hundred Thousands	Ten Thousands	Thousands	Hundreds	Tens	Ones
2	1	7	9	1	5
●●	○	●●● ●●● ●	○○○ ○○○ ○○○	○	○ ○ ○ ○ ○

There are 2 hundred thousands, 1 ten thousand, 7 thousands, 9 hundreds, 1 ten and 5 ones.

217 915 = 200 000 + 10 000 + 7000 + 900 + 10 + 5

We read 217 915 as two hundred and seventeen thousand, nine hundred and fifteen.



From the number discs shown above, we see that in the number 217 915:

The digit 2 in the hundred thousands place stands for 200 000.

The digit 1 in the ten thousands place stands for 10 000.

The digit 7 in the thousands place stands for 7000.

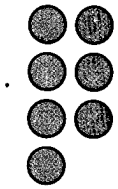
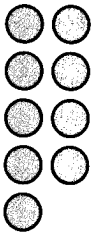
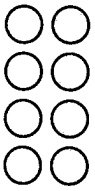
The digit 9 in the hundreds place stands for 900.

The digit 1 in the tens place stands for 10.

The digit 5 in the ones place stands for 5.

3. According to Census of Population 2000, the population of Singapore was about 3 746 918.

Let's represent the number using number discs.

Millions	Hundred Thousands	Ten Thousands	Thousands	Hundreds	Tens	Ones
3	7	4	6	9	0	0
						

The number is read as three million, seven hundred and forty-six thousand, nine hundred and eighteen.

What does each digit stand for in the number 3 746 900?

The digit 3 in the millions place stands for 3 000 000.

The digit 7 in the hundred thousands place stands for ☐.

The digit 4 in the ten thousands place stands for ☐.

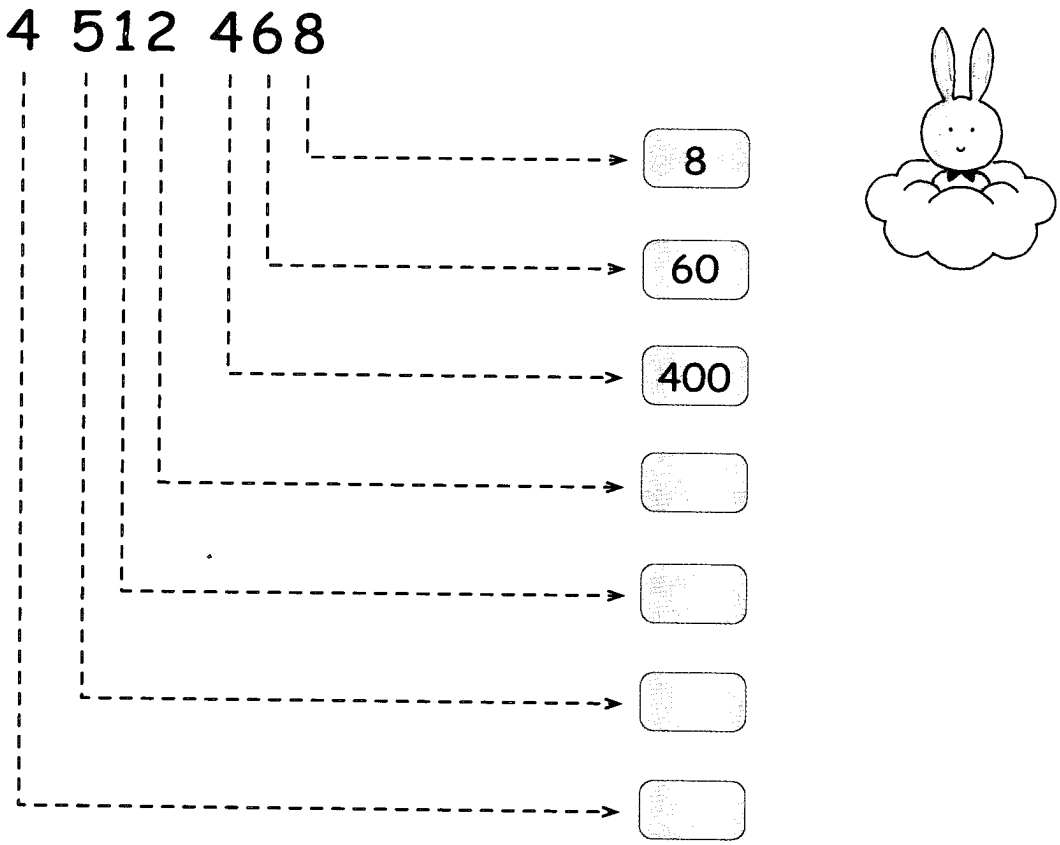
The digit 6 in the thousands place stands for ☐.

The digit 9 in the hundreds place stands for ☐.

The digit 0 in the tens place stands for ☐.

The digit 0 in the ones place stands for ☐.

5. What does each digit stand for in the number 4 512 468?



Work in pairs.
Write 7 different digits in the boxes below.

Using the digits above, form different 7-digit numbers, ask your partner to read them out and write them in words.

3. What are the missing numbers?

(a) 600 000 + 40 000 + 5000 + 300 + 20 + 8 = ☐

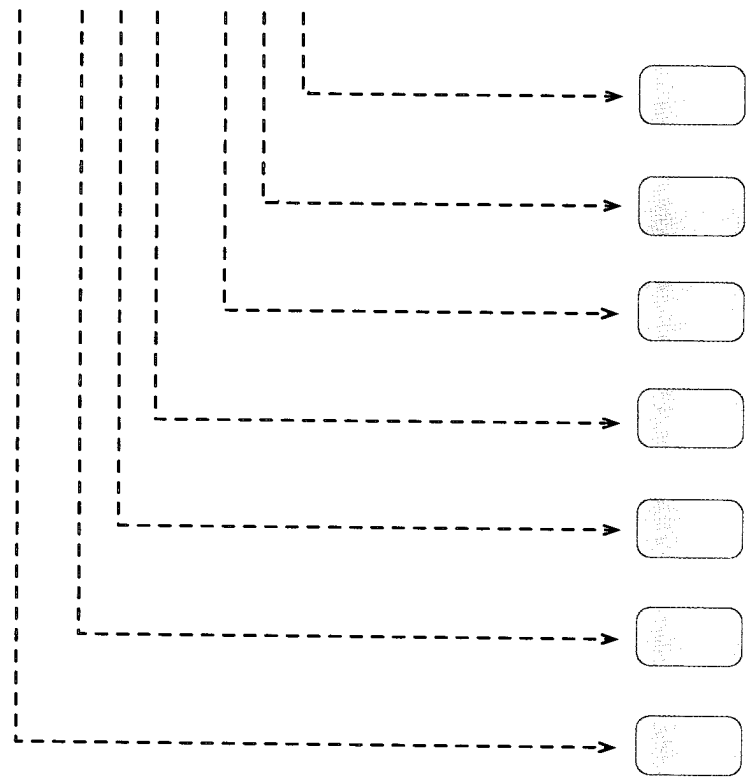
(b) 8 000 000 + ☐ + 30 000 + 4000 + 200 + 90 + 1
= 8 734 291

(c) 340 537 = 300 000 + ☐ + 500 + 30 + 7

(d) 1 002 201 = ☐ + 2000 + 200 + 1

4. What does each digit in the following number stand for?

3 751 014



3. Which one is the greatest, 430 690, 357 050 or 490 375?

Compare the digits in the hundred thousands place first.

3 is smaller than 4.
So 357 050 is the smallest.

Now we compare 430 690 and 490 375.
In the ten thousands place, 3 is smaller than 9.

So 430 690 is smaller than 490 375.

490 375 is the greatest.

•• Comparing Numbers

1. Circle the smaller number in each group.

   (a) 675 370 and 593 685.

   (b) 8 235 175 and 8 240 384.

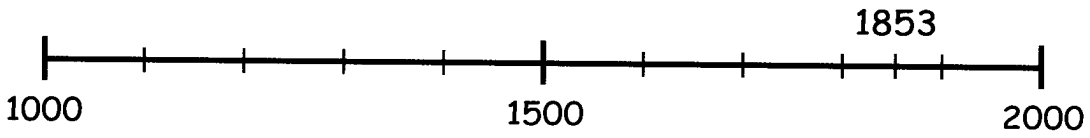
2. Circle the greatest number in each group.

   (a) 635 425, 345 679, 438 656

   (b) 1 374 255, 1 372 688, 1 505 377

   (c) 576 325, 567 495, 459 607

What is 1853 rounded off to the nearest thousand?



To round off 1853 to the nearest thousand, we look at the digit in the hundreds place.

The digit in the hundreds place of 1853 is 8 (greater than 5). 1853 is closer to 2000 than 1000.

We round off 1853 to 2000.

1853 is approximately 2000,

1853 ≈ 2000

2. Round off each of the following numbers to the nearest thousand.

(a) 16 531 ≈

(b) 607 254 ≈

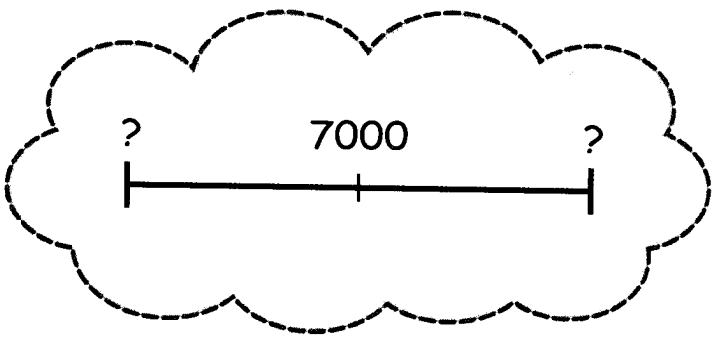
(c) 999 601 ≈

Discuss in groups.

An unknown whole number has been rounded off to the nearest thousand and the rounded off value is 7000.

What is the greatest possible whole number before rounding off?

What is the smallest possible whole number before rounding off?



Use the clues below to determine the unknown number.

(A) All of the digits are different.

(B) All of the digits are odd numbers.

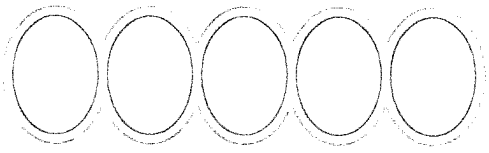
(C) The digit in the hundreds place is three times the digit in the thousands place.

(D) If 4 is subtracted from the digit in the ten thousands place, we will get the digit in the thousands place.

(E) The value of the digit in the ones place is the smallest.

(F) If 4 is added to the digit in the tens place, we will get the digit in the hundreds place.

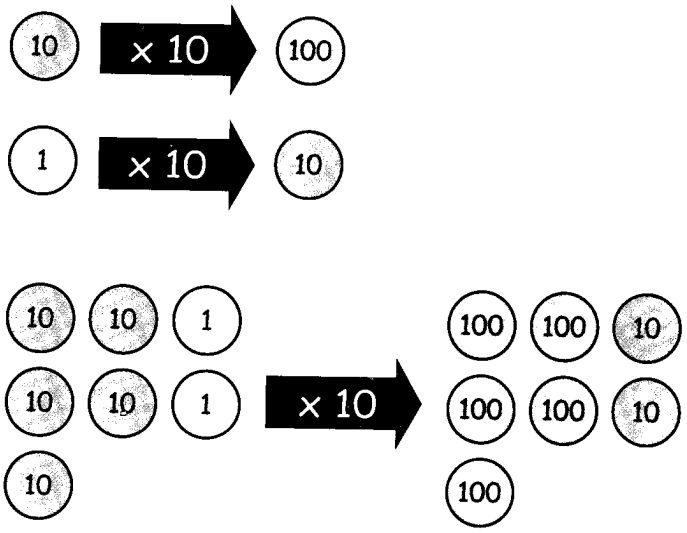
The number is :



Let's Learn •• Multiplication

Multiplying a whole number by tens

1. Multiply 52 by 10.



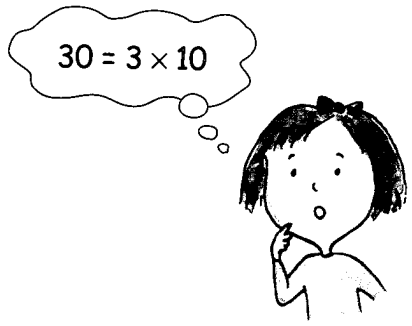
52 x 10 = 520

2. Multiply 84 x 30.

84 x 30 = 84 x 3 x 10
= 252 x 10
= 2520

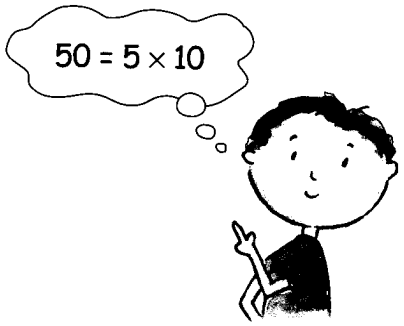
84 x 30 = 2520

$$\begin{array}{r} {}^{1}8\ 4 \\ \times \quad\ 3 \\ \hline 2\ 5\ 2 \end{array}$$



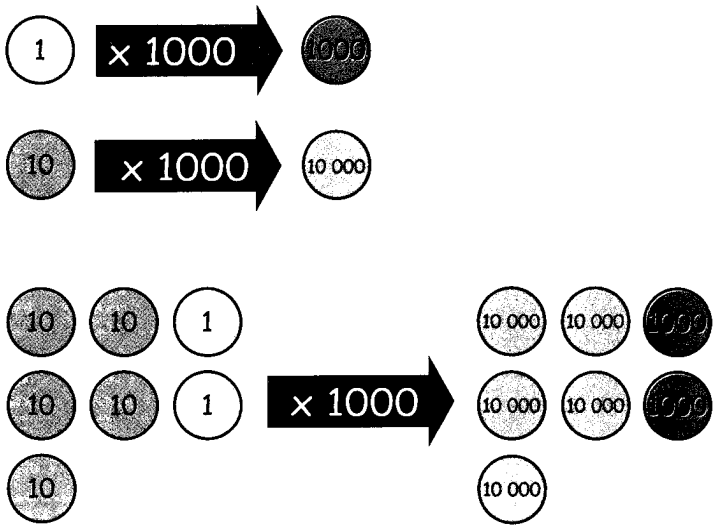
3. Multiply 72 by 50.

72 x 50 = 72 x ☐ x ☐
= ☐ x 10
= ☐



Multiplying a whole number by thousands

7. Multiply 52 by 1000.

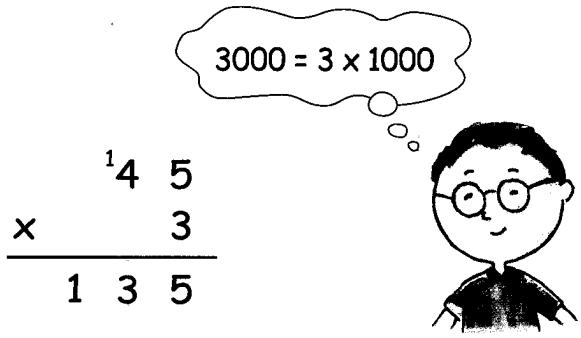


52 x 1000 = 52 000

8. Multiply 45 by 3000.

45 x 3000 = 45 x 3 x 1000
= 135 x 1000
= 135 000

45 x 3000 = 135 000



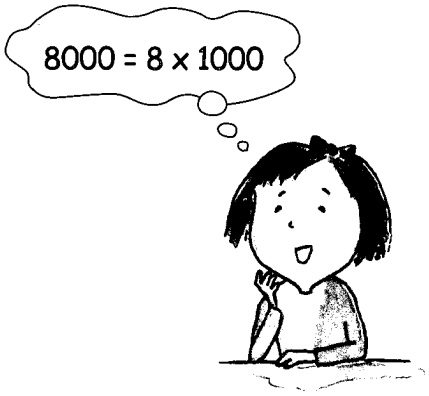
$$\begin{array}{r} {}^{1}4\ 5 \\ \times\quad 3 \\ \hline 1\ 3\ 5 \end{array}$$

9. Multiply 23 by 8000.

23 x 8000 = 23 x ☐ x ☐

= ☐ x ☐

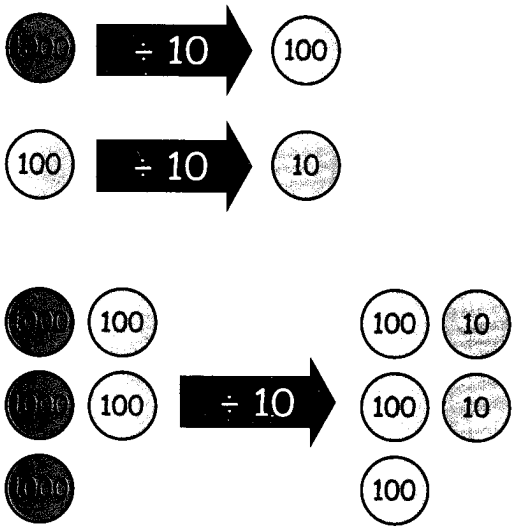
= ☐



Let's Learn ... Division

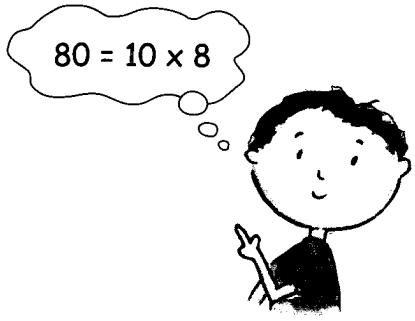
Dividing a whole number by tens

1. Divide 3200 by 10.



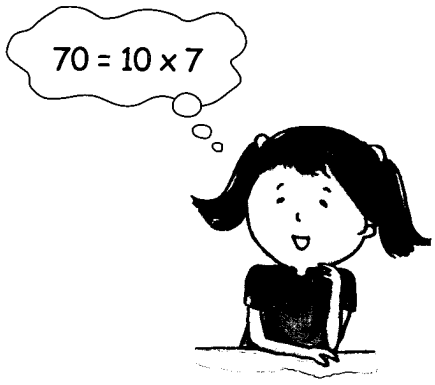
$3200 \div 10 = 320$

2. Divide 6400 by 80.



$$6400 \div 80 = 6400 \div 10 \div 8$$
$$= 640 \div 8$$
$$= 80$$

3. Divide 420 by 70.



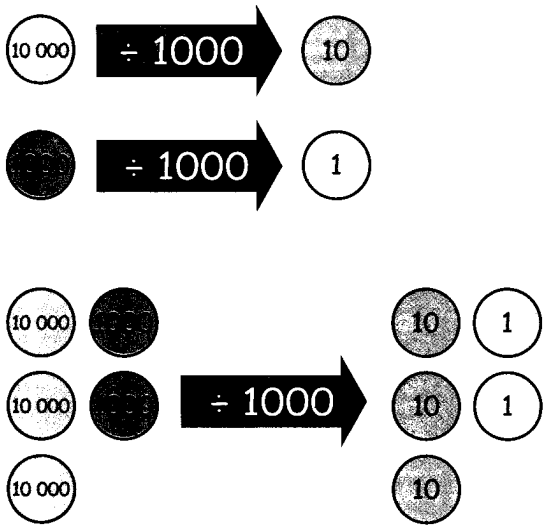
$420 \div 70 = 420 \div \boxed{10} \div \boxed{7}$

$= \boxed{42} \div 7$

$= \boxed{}$

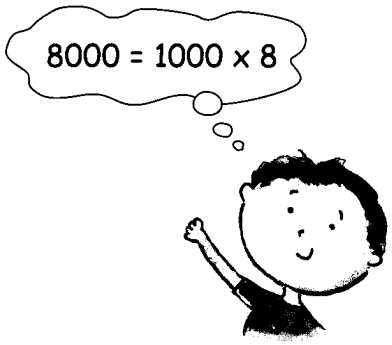
Dividing a whole number by thousands

7. Divide 32 000 by 1000.



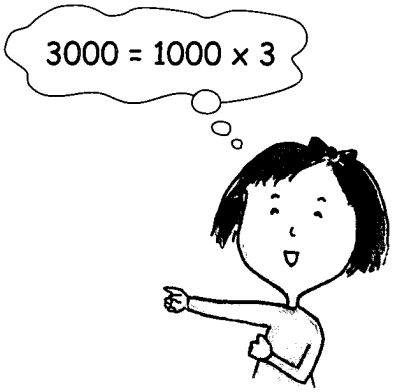
32 000 ÷ 1000 = 32

8. Divide 64 000 by 8000.



64 000 ÷ 8000 = 64 000 ÷ 1000 ÷ 8
= 64 ÷ 8
= 8

9. Divide 27 000 by 3000.



27 000 ÷ 3000 = 27 000 ÷ ☐ ÷ ☐

= ☐ ÷ ☐

= ☐

Let's Learn ... Use of Calculator

This is a calculator.

A calculator can help us calculate fast.

There are many types of calculators.
A basic calculator has the following keys:

Number keys: 0 1 2 3 4 5 6 7 8 9

Operation keys: ■ ■ ■ ■

Equal key: =

All clear key: on/c

Bracket keys: ( )

1. Use a calculator to find the value of 14 517 + 6498.

Step 1 Press the key on/c to switch on the calculator.

Step 2 Press the number keys: 1 4 5 1 7

Step 3 Press the operation key: ■

Step 4 Press the number keys: 6 4 9 8

Step 5 Press the equal key: =

Now, the screen of the calculator shows the result: 11 015

14 517 + 6498 = 21 015

Work in pairs.
Each partner takes turn to give a 4-digit number. The other partner enters this number into his/her calculator and then reduce it to zero in exactly four steps. Any of the 4 operations and any 2-digit numbers can be used. Write down the four steps used for each one.

For example: given 3545

STEP 1 $3545 + 55 = 3600$

STEP 2 $3600 \div 36 = 100$

STEP 3 $100 \div 10 = 10$

STEP 4 $10 - 10 = 0$

Discuss in groups.

Suppose the key 7 of your calculator is faulty. How can you use the calculator to find the following?

(a) 47 315 + 2083

(b) 70 350 - 46 355

Estimation

Sometimes a calculator may not function properly, or we may press the wrong key due to carelessness. We need to check if the answer given by a calculator is reasonable by estimation.

1. Get the exact answer of 6390 + 5992 using a calculator. Then, check if the answer is reasonable by estimation.

Press the following keys on a calculator.

The screen of the calculator shows: 12 382

6390 + 5992 = 12 382

Now, we check the answer by estimation.

Round off 6390 to the nearest thousand.
6390 ≈ 6000

Round off 5992 to the nearest thousand.
5992 ≈ 6000

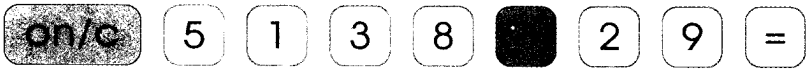
6390 + 5992 ≈ 6000 + 6000
= 12 000

The answer 12 382 given by the calculator is close to the estimated value 12 000.

So 12 382 is a reasonable answer.

3. Find 5138 x 29 using a calculator. Then, check if the answer is reasonable by estimation.

Press the following keys on a calculator:



The screen of the calculator shows: 149 002

5138 x 29 = 149 002

Now, we check the answer by estimation.

STEP 1 Round off 5138 to the nearest thousand.
5138 ≈ 5000

STEP 2 Round off 29 to the nearest ten.
29 ≈ 30

STEP 3 5138 x 29 ≈ 5000 x 30
= 150 000

The answer 149 002 is quite close to the estimated value 150 000.

So the answer is reasonable.

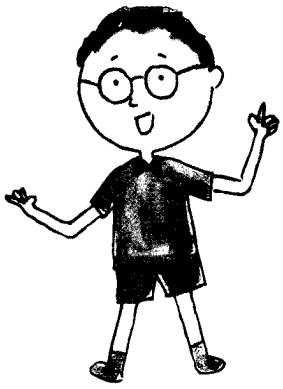
4. Estimate the value of 3306 x 2.

Round off 3306 to the nearest thousand.

3306 ≈ ☐

3306 x 2 ≈ ☐ x 2

= ☐



6. Estimate the value of $1732 \div 42$.

Round off 42 to the nearest ten: $42 \approx 40$.

Round off 1732 to 1600 such that 16 is a multiple of 4.

$1732 \approx 1600$

So $1732 \div 42 \approx \square \div 40$

$= \square$

How Much is One Million?

Work in groups.

Carry out the following activities.

Estimate the height of a stack of 1 million one-dollar coins.

- Discuss how you can do this.
- Write down the steps.
- Carry out the steps.
- Share your results with your class.

Estimation

1. Calculate each of the following using a calculator. Then estimate by rounding off the numbers to the nearest thousand. Say if the value given by the calculator is reasonable.

(a) 3780 + 2250 (b) 17 935 - 3107

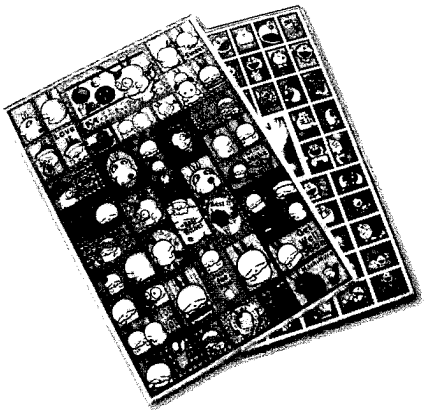
2. Calculate each of the following using a calculator. Then estimate by rounding off the first number to the nearest thousand and the second number to the nearest ten. Say if the value given by the calculator is reasonable.

(a) 4943 x 23 (b) 6198 x 48

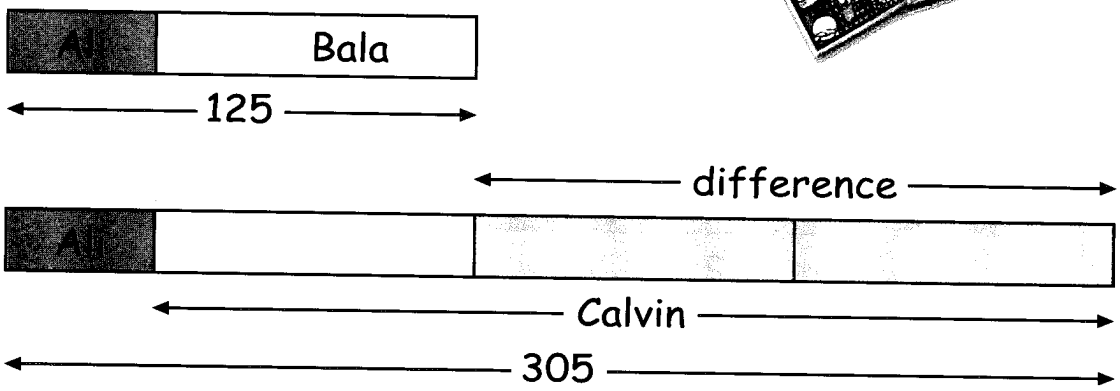
3. Calculate each of the following using a calculator. Then check if the value given by the calculator is reasonable by estimation.

(a) 9184 ÷ 32 (b) 17 898 ÷ 57

2. Ali and Bala have 125 stickers. Ali and Calvin have 305 stickers. If Calvin has 3 times as many stickers as Bala, how many stickers does Ali have?



We draw a model as follows.



The difference = 305 - 125
= 180

2 parts ⟶ 180 stickers

1 part ⟶ 180 ÷ 2
= 90 stickers

125 - 90 = 35 stickers

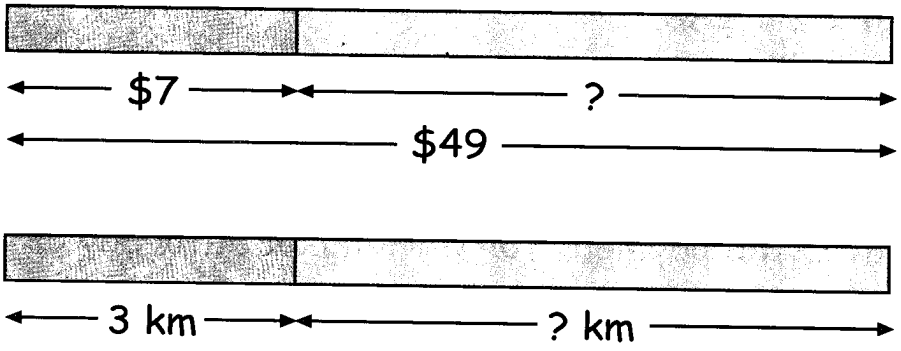
Ali has 35 stickers.

4. In a city, the taxi fare is charged as listed below.

For the first 3 km	$7
For every additional km	$2

Ali took a taxi from the centre of the city to the airport. He had to pay $49 as taxi fare. What is the distance from the centre of the city to the airport?

We draw a model as below:



$49 - $7 = $42
Ali paid $42 for the rest of the journey.

$42 ÷ $2 = 21
The rest of the journey is 21 km.

21 km + 3 km = 24 km
The total journey is 24 km.

6. The total collection from ticket sales in a concert was $5816. The price of a ticket for an adult was $12 and for a child was $8. There were 250 children at the concert. What is the number of adults at the concert?

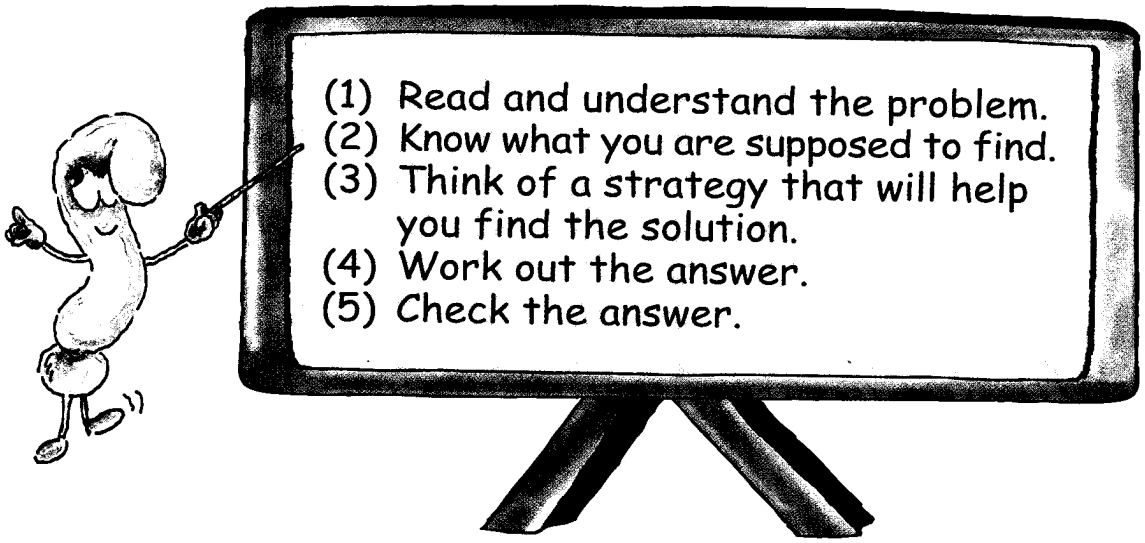
To find the number of adults at the concert, we need to know the collection from adult ticket sales. Since we know the total collection from all ticket sales, we only need to know the collection from children ticket sales. That is $8 x 250.

250 x $8 = $2000
The amount collected from children ticket sales was $2000.

$5 816 - $2 000 = $3816
The amount collected from adult ticket sales was $3816.

$3816 ÷ $12 = 318
There were 318 adults at the concert.

Generally, in solving word problems, the following steps are important.



Let's Learn •• Order of Operations

$28 - 6 \times (2 + 4) \div 3$

Do you know how to find the value of the above expression? Which operation comes first and which comes last?

We use the following rules when we do calculations involving the four operations.

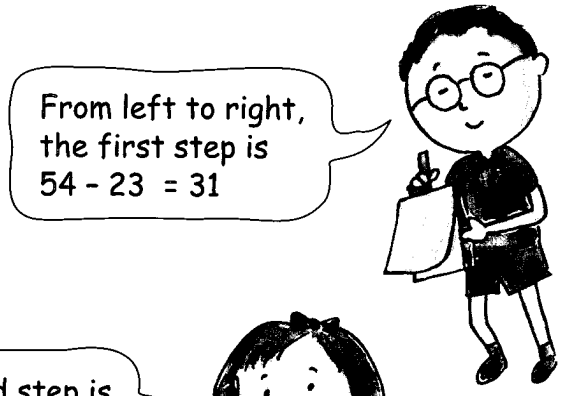
(a) When the expression involves only addition and subtraction, we do the operations from left to right.

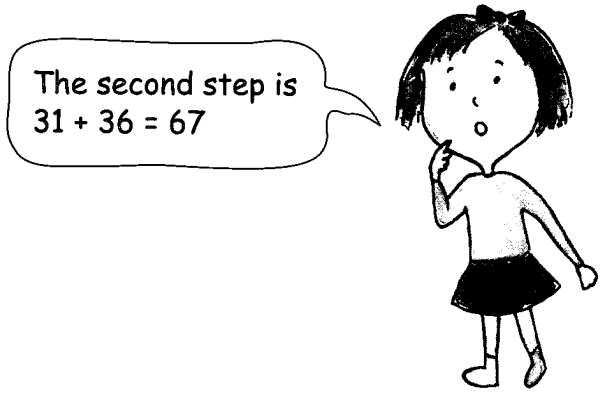
1. $54 - 23 + 36$

   $= \underline{54 - 23} + 36$

   $= 31 + 36$

   $= 67$





2. $28 + 12 - 15$

   $= \square - 15$

   $= \square$

3. $32 - 11 - 10$

   $= \square - 10$

   $= \square$

(c) When the expression involves addition, subtraction, multiplication and division, we do multiplication and division before addition and subtraction.

7. $15 - 3 \times 4 + 12 \div 4$

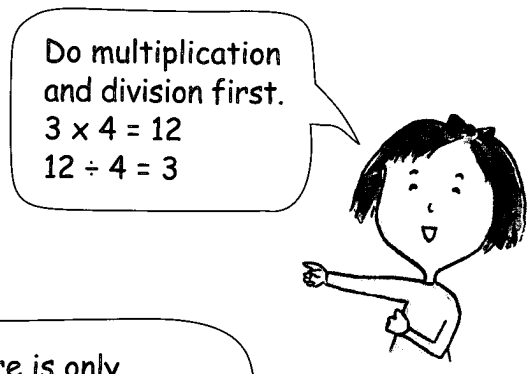
$= 15 - \underline{3 \times 4} + \underline{12 \div 4}$

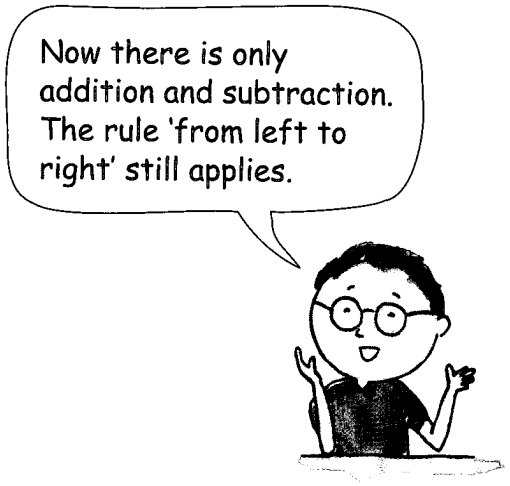
$= 15 - \underline{12} + \underline{3}$

$= \underline{15 - 12} + 3$

$= 3 + 3$

$= 6$





8. $23 + 15 \div 3 - 3 \times 8$

$= 23 +$ ☐ $-$ ☐

$=$ ☐ $-$ ☐

$=$ ☐

11. $28 - (28 - 17) \times 2 + (6 + 5)$

$= 28 - \square \times 2 + \square$

$= 28 - \square + \square$

$= \square + \square$

$= \square$

12. $16 + (20 + 8 \times 2) \div 4 - (15 - 11)$

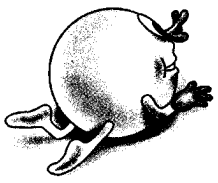
$= 16 + (20 + \square) \div 4 - \square$

$= 16 + \square \div 4 - \square$

$= 16 + \square - \square$

$= \square - \square$

$= \square$



Let's Try .. Order of Operations

1. Find the value of each of the following.

   (a) 16 + 5 + 11
   (b) 28 - 12 - 9
   (c) 46 + 68 - 37
   (d) 56 - 29 + 14
   (e) 215 - 76 + 108
   (f) 443 + 69 - 28

2. Find the value of each of the following.

   (a) 3 x 7 x 5
   (b) 81 ÷ 9 ÷ 3
   (c) 40 x 2 ÷ 5
   (d) 33 ÷ 3 x 7
   (e) 54 ÷ 2 x 4
   (f) 14 x 9 ÷ 3

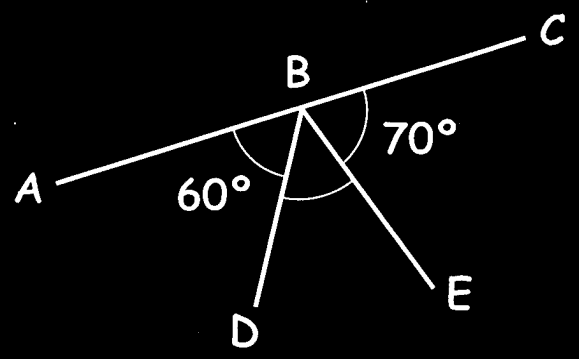
3. Find the value of each of the following.
   Then check the answers by using a calculator.

   (a) 10 + 2 x 8
   (b) 26 - 14 ÷ 2
   (c) 48 - 5 x 3
   (d) 72 + 35 ÷ 7
   (e) 9 + 27 ÷ 3 x 6
   (f) 100 - 10 x 3 + 64

4. Find the value of each of the following.
   Then check the answers by using a calculator.

   (a) 24 ÷ (5 + 3) x 5
   (b) (18 - 2) ÷ 2
   (c) (6 + 5) x (15 - 7)
   (d) (32 - 4) ÷ 7 - 3
   (e) 71 + (24 - 8) x 10
   (f) (17 + 5) x 4 ÷ 8

Angles

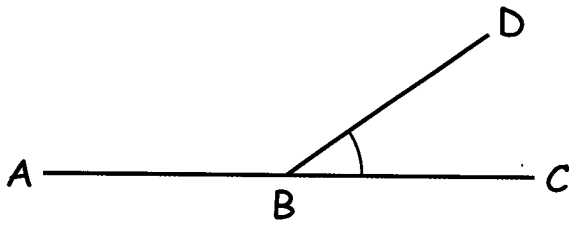


straight line
60°
70°
?

Do You Know?

How do we get ∠DBE?

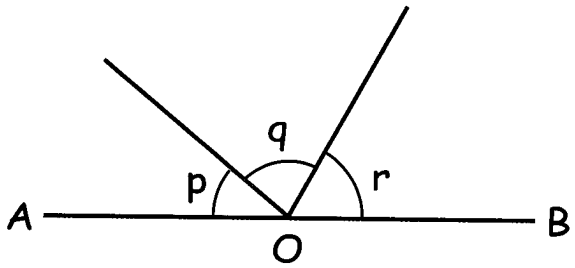
2. AC is a straight line and D is a point that is not on the line AC. Draw a straight line DB which intersects AC at B. Then $\angle ABD$ and $\angle CBD$ are angles on a straight line.



Use a protractor to measure $\angle ABD$ and $\angle CBD$.

$\angle ABD = 145°$
$\angle DBC = 35°$
$\angle ABD + \angle DBC = 145° + 35°$
$= 180°$

3. $\angle p$, $\angle q$ and $\angle r$ are angles on a straight line.



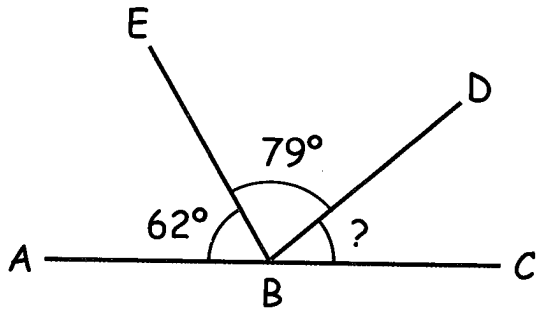
Use a protractor to measure $\angle p$, $\angle q$ and $\angle r$.
$\angle p = 40°$
$\angle q = 80°$
$\angle r = 60°$

$\angle p + \angle q + \angle r = 40° + 80° + 60°$
$= 180°$

From the above examples, what can you conclude about the sum of angles on a straight line?

Angles on a straight line add up to 180°.

3. ABC is a straight line. $\angle ABE = 62°$ and $\angle EBD = 79°$. Find $\angle DBC$.



ABC is a straight line, so

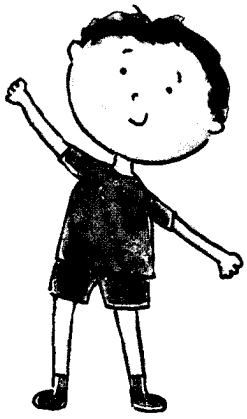
$\angle ABE + \angle EBD + \angle DBC = 180°$

$\angle DBC = 180° - \angle ABE - \angle EBD$

$= 180° - \square° - \square°$

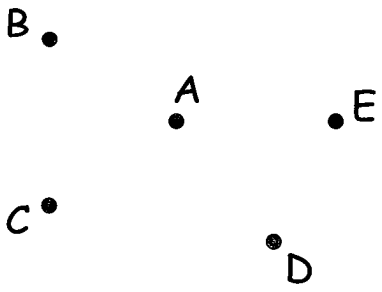
$= \square° - \square°$

$= \square°$

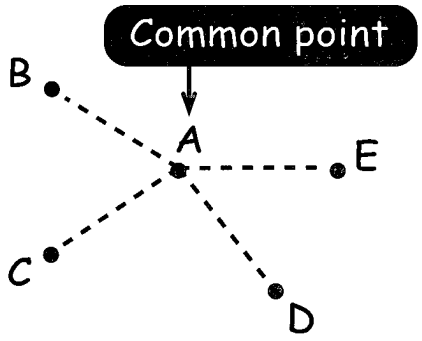


Let's Learn ... Angles at a Point

A is a point and B, C, D and E are points around A.

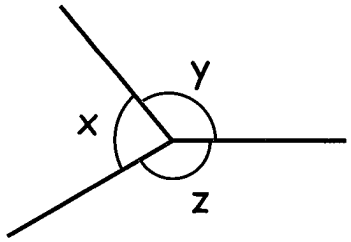


By joining the points B, C, D and E to A, we create different angles. ∠BAC, ∠CAD, ∠DAE and ∠EAB all meet at a common point, A. They are known as angles at a point.



Use a protractor to measure ∠x, ∠y, ∠z.

∠x = 80°
∠y = 130°
∠z = 150°
} Angles at a point

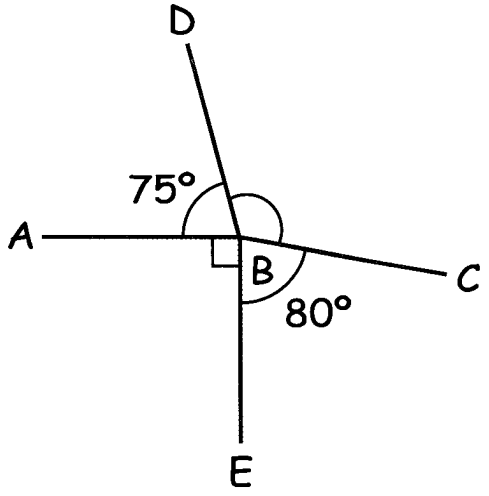


∠x + ∠y + ∠z = 80° + 130° + 150°
= 360°

Sum of angles at a point

Angles at a point add up to 360°.

3. Find $\angle DBC$.



$\angle ABE = 90°$

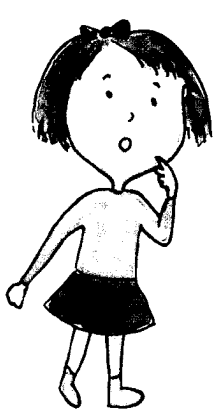
$\angle ABD = 75°$

$\angle EBC = 80°$

$\square + \square + \square + \angle DBC = 360°$

$\angle DBC = \square - \square - \square - \square$

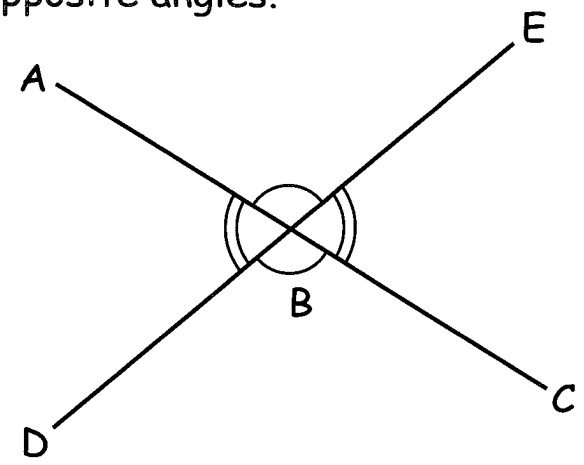
$= \square$



Let's Learn .. Vertically Opposite Angles

ABC and DBE are two straight lines.
When the two lines intersect at B, they form four angles:
$\angle ABE$, $\angle ABD$, $\angle DBC$ and $\angle CBE$.

$\angle ABE$ and $\angle DBC$ are vertically opposite angles.
$\angle ABD$ and $\angle EBC$ are also vertically opposite angles.

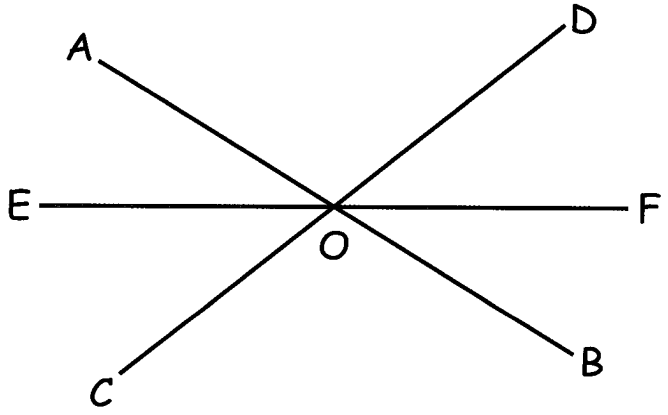


Measure $\angle ABE$, $\angle DBC$, $\angle ABD$ and $\angle CBE$.

$\angle ABE = \angle DBC = 110°$;
$\angle ABD = \angle CBE = 70°$.

Let's look at another figure.

In the figure, AB, EF and CD are three straight lines.



$\angle AOE$ and ☐ are vertically opposite angles.

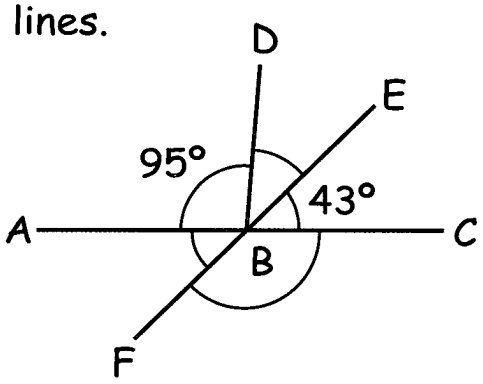
$\angle EOC$ and ☐ are vertically opposite angles.

List more pairs of vertically opposite angles in the figure. Measure each pair of angles. What conclusion can you make about the vertically opposite angles?

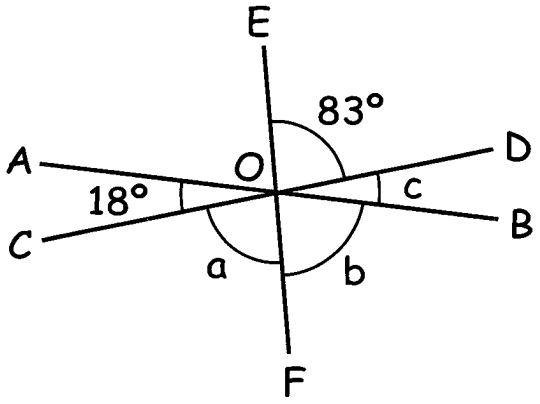
Let's Try .. Vertically Opposite Angles

The following figures are not drawn to scale.

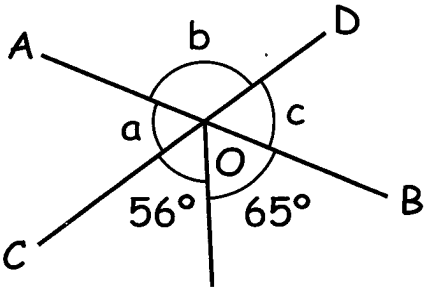
(a) ABC and FBE are two straight lines.
Find ∠DBE, ∠ABF and ∠FBC.



(b) AOB, COD and EOF are three straight lines.
Find ∠a, ∠b and ∠c.



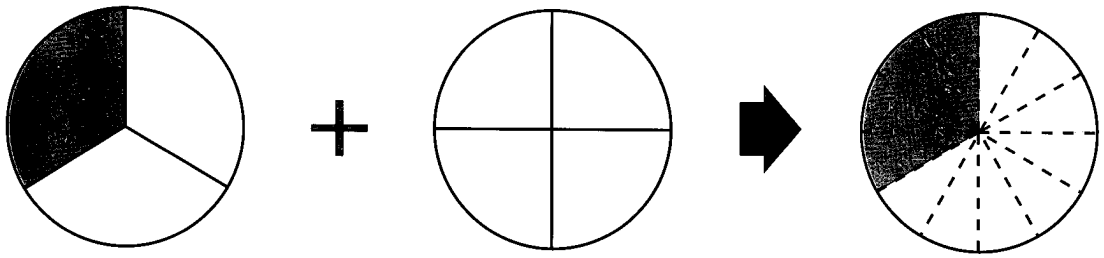
(c) AOB and COD are two straight lines.
Find ∠a, ∠b and ∠c.



Let's Learn .. Addition and Subtraction of Proper Fractions

1. John and Mary shared a cake for tea. John ate $\frac{1}{3}$ of it and Mary ate $\frac{1}{4}$ of it.
   What fraction of the cake did they eat altogether?

$\frac{1}{3} + \frac{1}{4} = ?$



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

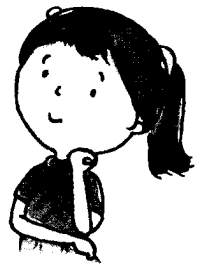
$= \frac{4+3}{12}$

$= \frac{7}{12}$

List their equivalent fractions:

$\frac{1}{3} = \frac{2}{6} = \frac{3}{9} = \frac{4}{12} = ...$

$\frac{1}{4} = \frac{2}{8} = \frac{3}{12} = \frac{4}{16} = ...$



John and Mary ate $\frac{7}{12}$ of the cake altogether.

4. Find the value of $\frac{3}{10} + \frac{5}{6}$.

$\frac{3}{10} + \frac{5}{6}$

$= \frac{9}{30} + \frac{25}{30}$

$= \frac{34}{30}$

$= \frac{17}{15}$

$= 1\frac{2}{15}$

List their equivalent fractions:

$\frac{3}{10} = \frac{6}{20} = \frac{9}{30} = \frac{12}{40} = \frac{15}{20}$ .....

$\frac{5}{6} = \frac{10}{12} = \frac{15}{18} = \frac{20}{24} = \frac{25}{30}$ .....

5. Find the value of $\frac{3}{5} - \frac{1}{4}$.

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

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

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

List their equivalent fractions:

$\frac{3}{5} = \frac{6}{10} = \frac{9}{15} = \frac{12}{20} = \frac{15}{25}$ .....

$\frac{1}{4} = \frac{1}{8} = \frac{3}{12} = \frac{4}{16} = \frac{5}{20}$ .....

Let's Learn ... Addition and Subtraction Involving Mixed Numbers (I)

1. Ali and Mary shared some chocolate bars.

   Ali got $1\frac{2}{5}$ and Mary got $1\frac{4}{5}$ chocolate bars.

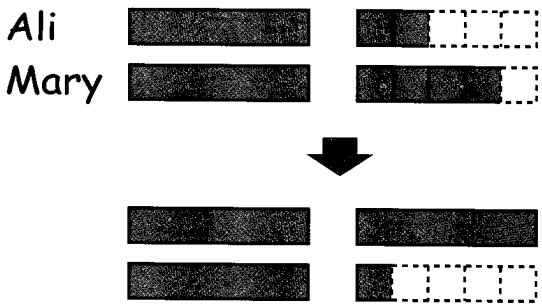
   How many chocolate bars did Ali and Mary get altogether?

$$1\frac{2}{5} + 1\frac{4}{5}$$

$$= 2\frac{2}{5} + \frac{4}{5}$$

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

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



We do the addition in 3 steps:

Step 1: Add the whole numbers.

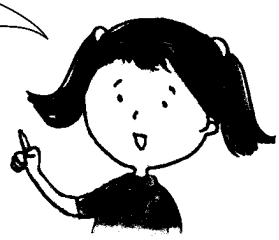
$$1\frac{2}{5} + 1\frac{4}{5} = 2\frac{2}{5} + \frac{4}{5}$$

Step 2: Add the fractions.

$$2\frac{2}{5} + \frac{4}{5} = 2\frac{6}{5}$$

Step 3: Simplify the mixed number if necessary.

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

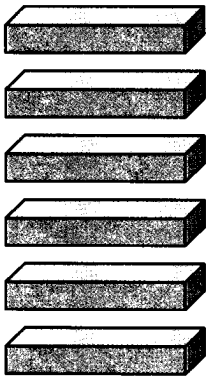


Ali and Mary got $3\frac{1}{5}$ chocolate bars altogether.

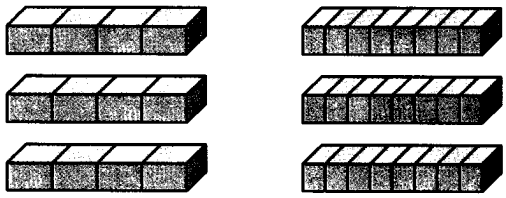
Addition and Subtraction Involving Mixed Numbers (1)

1. Add and subtract the mixed numbers using fraction bars.

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

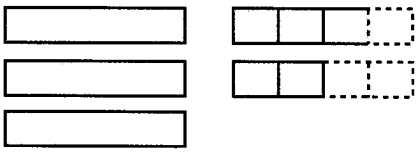


(b) $2\frac{5}{8} - 1\frac{1}{8}$

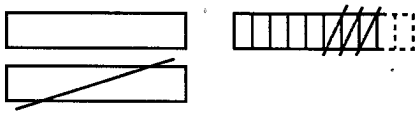


2. Add and subtract the mixed numbers.

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

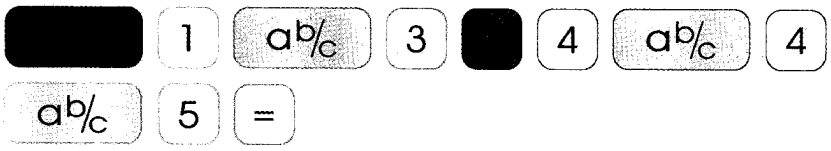


(b) $2\frac{4}{5} - 1\frac{3}{10}$



2. Add $\frac{1}{3}$ and $4\frac{4}{5}$.

Press the following keys on a calculator:

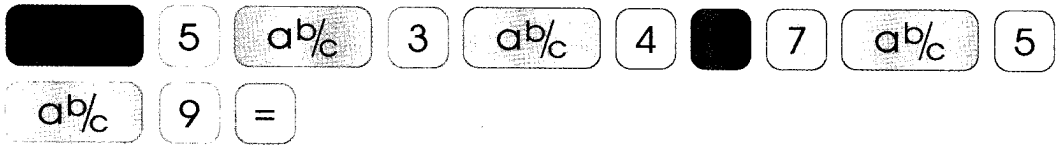


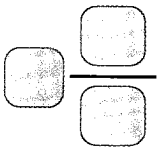
The screen shows the result: $5\frac{2}{15}$

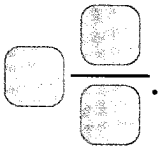
So, $\frac{1}{3} + 4\frac{4}{5} = 5\frac{2}{15}$.

3. Add $5\frac{3}{4}$ and $7\frac{5}{9}$.

Press the following keys on a calculator:



The screen shows the result: 

So, $5\frac{3}{4} + 7\frac{5}{9} =$  .

Addition and Subtraction Involving Mixed Numbers (II)

1. Add using a calculator.

(a) $\frac{5}{6} + \frac{3}{8}$

(b) $1\frac{2}{3} + \frac{1}{4}$

(c) $4\frac{4}{5} + 1\frac{5}{7}$

(d) $3\frac{5}{6} + 4\frac{7}{9}$

2. Subtract using a calculator.

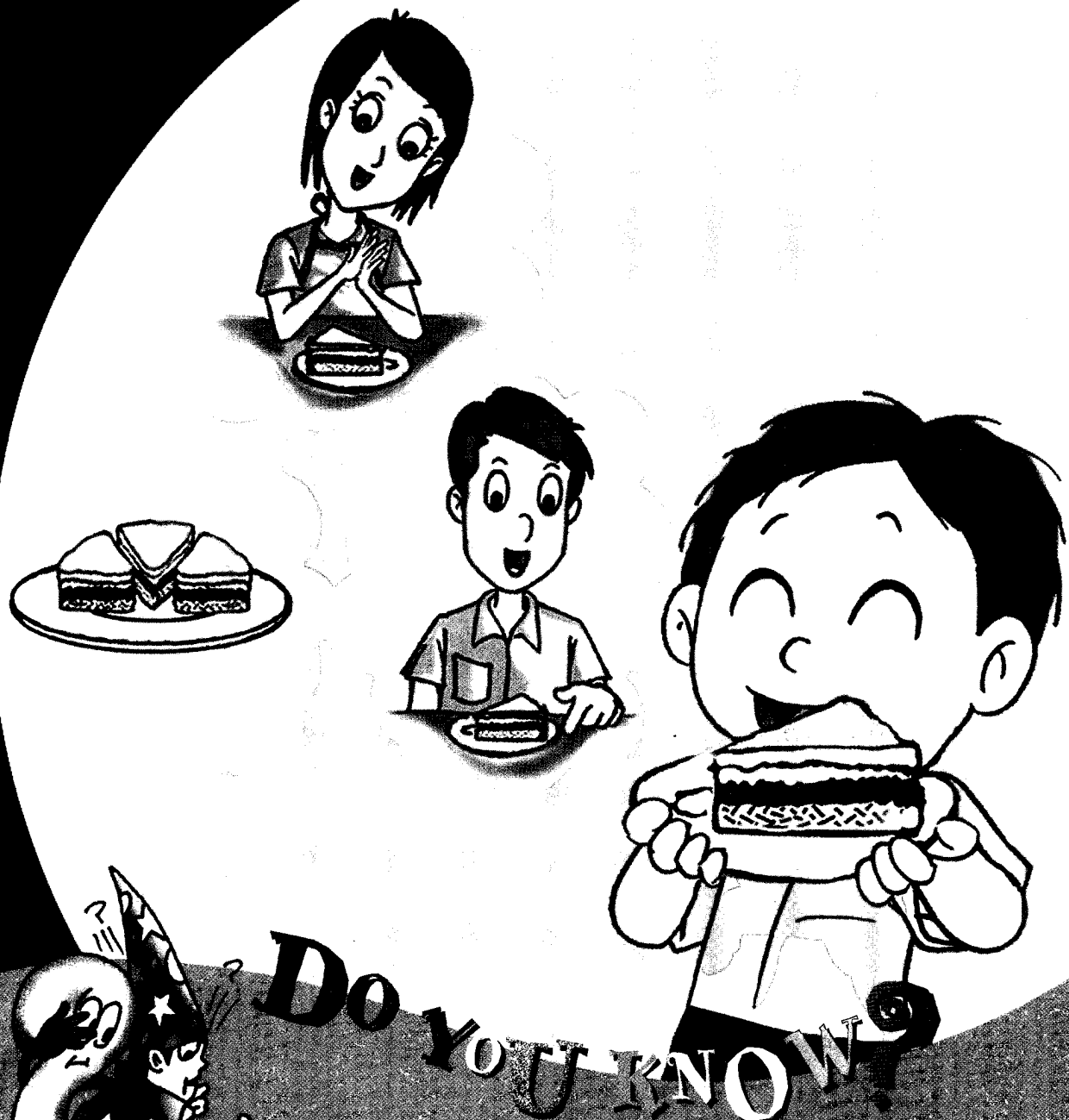
(a) $\frac{3}{4} - \frac{3}{5}$

(b) $7\frac{2}{9} - 3\frac{4}{5}$

(c) $3\frac{5}{8} - 2\frac{3}{10}$

(d) $6\frac{5}{12} - 3\frac{2}{5}$

5 Fractions (II)

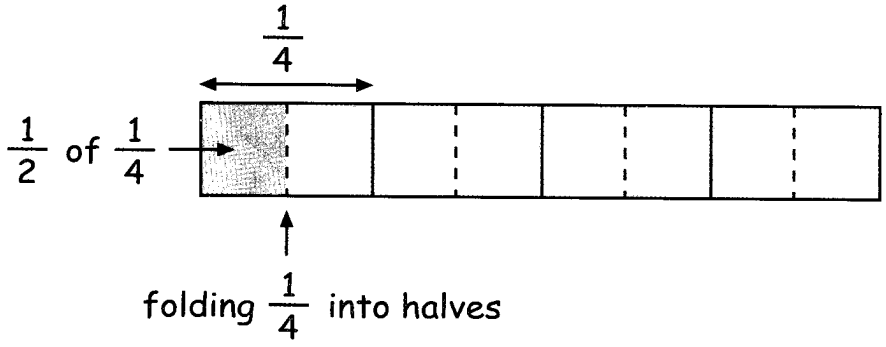


DO YOU KNOW?

Jeremy's neighbour gave him half of a cake. If Jeremy shared the cake with his mother and father equally, how much cake did each person get?

2. What is $\frac{1}{2}$ of $\frac{1}{4}$?

We can get $\frac{1}{2}$ of $\frac{1}{4}$ by folding all the $\frac{1}{4}$ into halves.



Look at $\frac{1}{2}$ of $\frac{1}{4}$ and compare it to the whole strip of paper.

$\frac{1}{2}$ of $\frac{1}{4}$ is $\frac{1}{8}$ of the whole strip of paper.

We can also get by $\frac{1}{8}$ by calculation.

$\frac{1}{2}$ of $\frac{1}{4}$

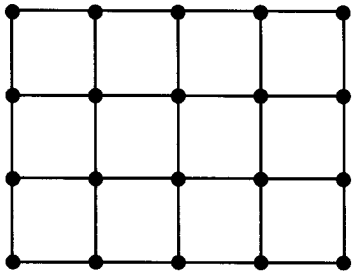
$= \frac{1}{2} \times \frac{1}{4}$

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

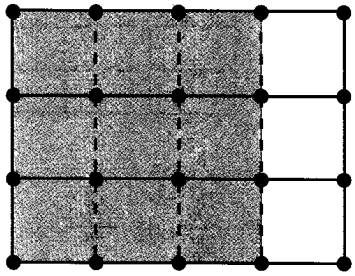
$= \frac{1}{8}$

Work in pairs.
Let's find out what is $\frac{1}{3}$ of $\frac{3}{4}$ by drawing on a grid paper.

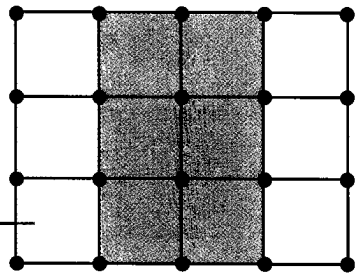
Draw a rectangle on the grid paper as shown.



Divide this rectangle into 4 equal parts. Colour $\frac{3}{4}$ of this rectangle.



Find the space that is $\frac{1}{3}$ of $\frac{3}{4}$ on this rectangle.

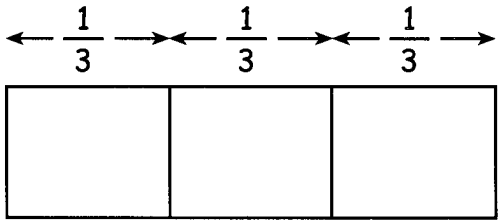


Find out what fraction is $\frac{1}{3}$ of $\frac{3}{4}$ by counting the number of squares in the rectangle. Do you get $\frac{3}{12}$?

What about $\frac{2}{3}$ of $\frac{3}{4}$?

Let's Try .. Multiplication of Proper Fractions

1. Show $\frac{3}{4}$ of $\frac{1}{3}$ by dividing each small rectangle shown below into 4 equal parts. Then, shade 3 of these parts in one of the rectangles.



Look at your diagram. What fraction of the whole is $\frac{3}{4}$ of $\frac{1}{3}$?

Find $\frac{3}{4} \times \frac{1}{3}$ and express your answer in its simplest form. Does your answer agree with your diagram?

2. Find the product of the fractions and express it in its simplest form.

(a) $\frac{1}{3} \times \frac{3}{4}$ (b) $\frac{5}{6} \times \frac{2}{5}$

(c) $\frac{3}{4} \times \frac{6}{7}$ (d) $\frac{3}{8} \times \frac{2}{5}$

We can also use a calculator to do multiplication of improper fractions.

5. What is the product of $\frac{4}{5}$ and $\frac{14}{8}$?

$\frac{4}{5} \times \frac{14}{8} = ?$

Press the following keys on a calculator:

The screen shows the result: $1\frac{2}{5}$

So, $\frac{4}{5} \times \frac{14}{8} = 1\frac{2}{5}$

6. What is the product of $\frac{4}{3}$ and $\frac{13}{7}$?

$\frac{4}{3} \times \frac{13}{7} = ?$

Press the following keys on a calculator:

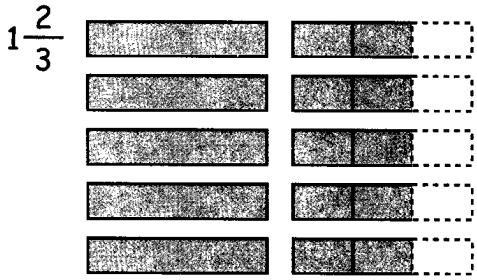
The screen shows the result: $2\frac{10}{21}$

So, $\frac{4}{3} \times \frac{13}{7} = 2\frac{10}{21}$

Let's Learn .•. Multiplication of a Mixed Number and a Whole Number

1. Five children shared some mini cake rolls together.

   If each of them had $1\frac{2}{3}$ rolls, how many mini cake rolls did 5 of them have?



$1\frac{2}{3} \times 5$

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

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

$= \frac{25}{3}$

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

So, $1\frac{2}{3} \times 5 = 8\frac{1}{3}$.

We do the multiplication in 3 steps:

Step 1: Convert $1\frac{2}{3}$ to an improper fraction:

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

Step 2: Multiply the improper fraction with the whole number:

$\frac{5}{3} \times 5 = \frac{5 \times 5}{3} = \frac{25}{3}$

Step 3: Simplify the result:

$\frac{25}{3} = 8\frac{1}{3}$

We can use a calculator to find the product.

4. Calculate $3\frac{3}{5} \times 7$.

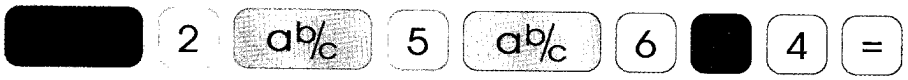
Press the following keys on a calculator:

The screen shows the result: $2\frac{1}{5}$

So, $3\frac{3}{5} \times 7 = 25\frac{1}{5}$.

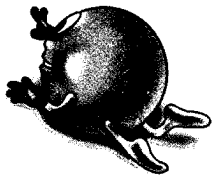
5. Calculate $2\frac{5}{6} \times 4$.

Press the following keys on a calculator:



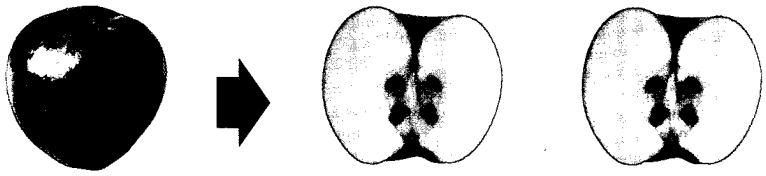
The screen shows the result: $11\frac{1}{3}$

So, $2\frac{5}{6} \times 4 = 11\frac{1}{3}$.

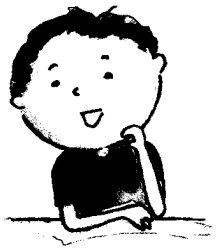


Let's Learn... Fraction as Division

1. John shares an apple equally with his sister, Mary. What fraction of the apple does each of them get?



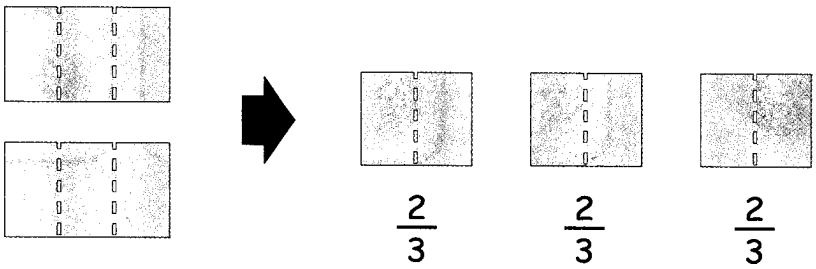
1 apple $\frac{1}{2}$ apple $\frac{1}{2}$ apple



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

Each of them gets $\frac{1}{2}$ of the apple.

2. Siti's mother baked 2 cakes. The 2 cakes are to be shared equally among 3 people. What fraction of a cake does each of them get?



$\frac{2}{3}$ $\frac{2}{3}$ $\frac{2}{3}$

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

Each of them gets $\frac{2}{3}$ of a cake.

4. Fill in the blanks.

(a) $4 \div 11 = \frac{\square}{\square}$

(b) $10 \div 9 = \frac{\square}{\square} = \square\frac{\square}{\square}$

(c) $\frac{4}{7} = 4 \div \square$

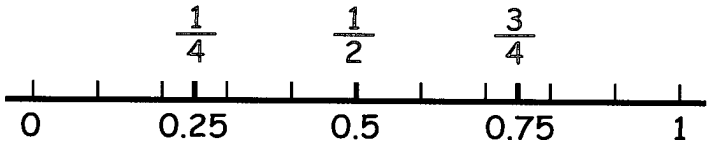
(d) $25 \div 5 = \frac{\square}{\square} \div \square$

(e) $\frac{5}{12} = \square \div \square$

(f) $\frac{2}{5} = \square \div \square$

5. Express $\frac{3}{4}$ as a decimal.

$\frac{3}{4} = 3 \div 4 = 0.75$



$$\begin{array}{r} 0.75 \\ 4\overline{)3.00} \\ -28 \\ \hline 20 \\ -20 \\ \hline 0 \end{array}$$

We can also do it in this way:

$\frac{3}{4} = \frac{3 \times 25}{4 \times 25} = \frac{75}{100} = 0.75$

Fraction as Division

1. Express the following divisions as fractions in their simplest forms.

(a) $4 \div 8$	(b) $2 \div 6$	(c) $3 \div 12$
(d) $2 \div 10$	(e) $5 \div 15$	(f) $6 \div 8$
(g) $8 \div 10$	(h) $10 \div 12$	(i) $12 \div 20$

2. Convert the following fractions into decimals.

(a) $\frac{3}{5}$	(b) $\frac{5}{8}$	(c) $\frac{6}{5}$
(d) $\frac{23}{50}$	(e) $\frac{13}{8}$	(f) $\frac{30}{25}$

3. Convert the following decimals into fractions in their simplest forms.

(a) 0.4	(b) 0.8	(c) 1.4
(d) 0.22	(e) 0.74	(f) 1.06
(g) 5.6	(h) 7.9	(i) 12.8

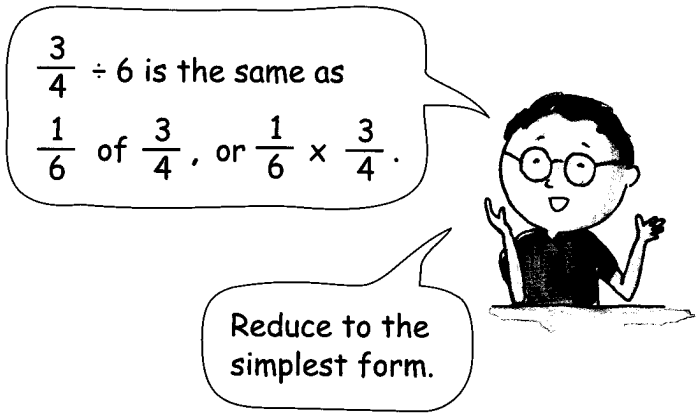
3. Find $\frac{3}{4} \div 6$.

$$\frac{3}{4} \div 6 = \frac{3}{4} \times \frac{1}{6}$$

$$= \frac{3 \times 1}{4 \times 6}$$

$$= \frac{3}{24}$$

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



Alternatively, you can divide the numerator and denominator by a common factor before multiplication.

$$\frac{3}{4} \div 6 = \frac{{}^{1}\cancel{3}}{4} \times \frac{1}{\cancel{6}_{2}}$$

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

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

4. Divide the following and write each answer in its simplest form.

(a) $\frac{2}{3} \div 6 = \frac{3}{4} \times \frac{\square}{\square} = \frac{\square}{\square} = \frac{\square}{\square}$

(b) $\frac{2}{5} \div 18 = \frac{2}{5} \times \frac{\square}{\square} = \frac{\square}{\square} = \frac{\square}{\square}$

Let's Try .. Division of a Fraction by a Whole Number

1. The shaded part is $\frac{3}{4}$ of a piece of paper. Divide the shaded part into 6 equal parts and colour one part green.
   What fraction of the piece of paper is coloured green?

2. Divide. Write your answers in the simplest form.

(a) $\frac{3}{5} \div 7$

(b) $\frac{5}{11} \div 6$

(c) $\frac{7}{12} \div 20$

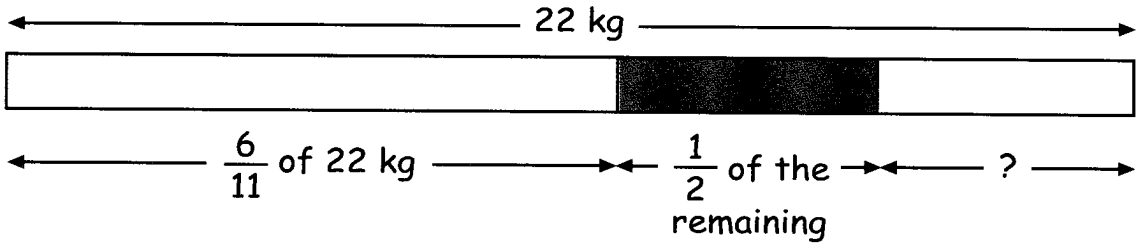
(d) $\frac{5}{6} \div 10$

(e) $\frac{3}{7} \div 15$

(f) $\frac{2}{9} \div 24$

2. A food stall owner bought 22 kg of chicken. He fried $\frac{6}{11}$ of them. After that, he cooked curry with $\frac{1}{2}$ of the chicken that was left. He kept the rest of the chicken in the refrigerator.

What was the mass of the chicken kept in the refrigerator?



Mass of chicken that was fried = $\frac{6}{11} \times 22 = 12$ kg

Mass of chicken that was left = 22 - 12 = 10 kg

Mass of chicken cooked in curry = $\frac{1}{2} \times 10 = 5$ kg

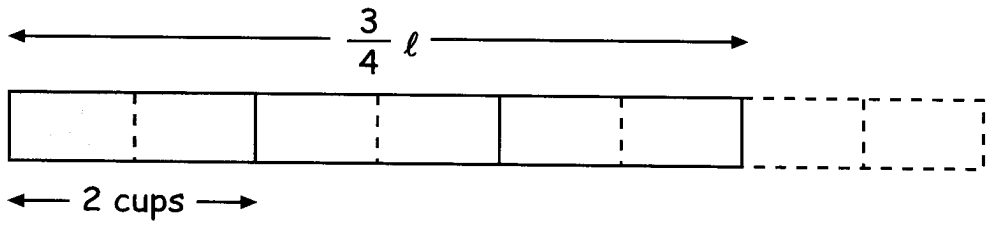
Mass of chicken in the refrigrator = 22 - 12 - 5

= 5 kg

The mass of chicken kept in the refrigerator was 5 kg.

4. $\frac{3}{4}$ ℓ of milk was poured equally into 6 cups. Patrine drank 2 cups. How much milk did Patrine drink? Give your answer in ℓ.

We draw a model as follows.



6 cups $\longrightarrow$ $\frac{3}{4}$ ℓ

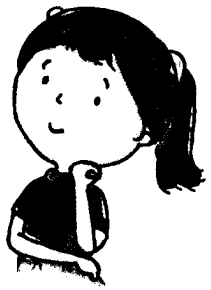
1 cup $\longrightarrow$ $\frac{3}{4} \div 6$

$= \frac{\overset{1}{\cancel{3}}}{4} \times \frac{1}{\cancel{6}_2}$

$= \frac{1}{8}$ ℓ

2 cups $\longrightarrow$ $\frac{1}{8} \times 2$

$= \frac{1}{4}$ ℓ



Patrine drank $\frac{1}{4}$ ℓ of milk.

Let's Try .. Word Problems

1. Mr Razak's salary is $4000 per month. He saves $\frac{1}{5}$ of it and spends $\frac{1}{3}$ of it on household expenditure. How much money is left for other expenditures?

2. A father gave $200 to his 4 children. The eldest child got $\frac{2}{5}$ of the money and the rest of the three children shared the remaining amount equally. Find the amount of money received by the youngest child.

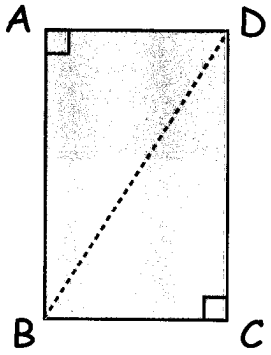
3. There are 1200 pupils in a school. $\frac{2}{3}$ of them are girls. $\frac{1}{4}$ of the boys are overweight. How many boys are overweight?

4. After Jenny spent $\frac{1}{13}$ of her savings on a schoolbag, she had $780 left. Find Jenny's savings at first.

Let's Learn .. Area of a Triangle

Get a piece of rectangular paper and draw a dotted line as shown.

Cut along the dotted line and you get 2 right-angled triangles.

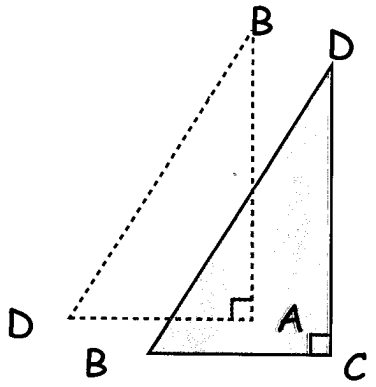


Compare the area of the 2 triangles.

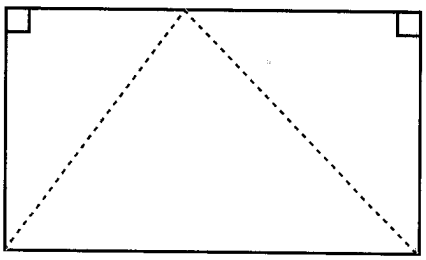
Area of triangle DBC

= area of triangle BDA

= $\frac{1}{2}$ of area of rectangle ABCD



Take another piece of rectangular paper and draw two dotted lines as shown.

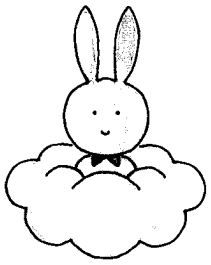


We can see that the height and base of the triangle are in fact the length and breadth of its related rectangle. Therefore,

Area of a triangle = $\frac{1}{2}$ x area of the related rectangle

= $\frac{1}{2}$ x length x breadth of the rectangle

= $\frac{1}{2}$ x base x height of the triangle



Area of a triangle = $\frac{1}{2}$ x base x height

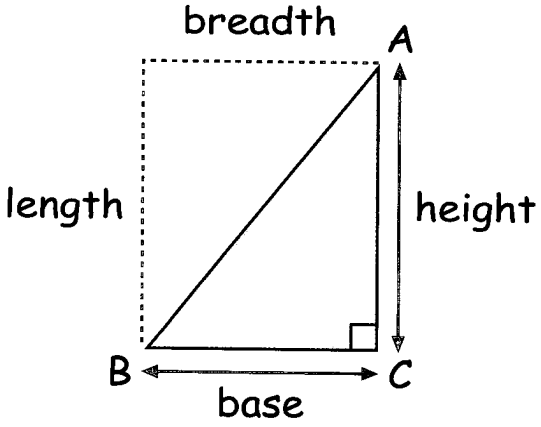
As the base and height of a triangle are the length and breadth of its related rectangle, the base and height of a triangle must be perpendicular to each other.

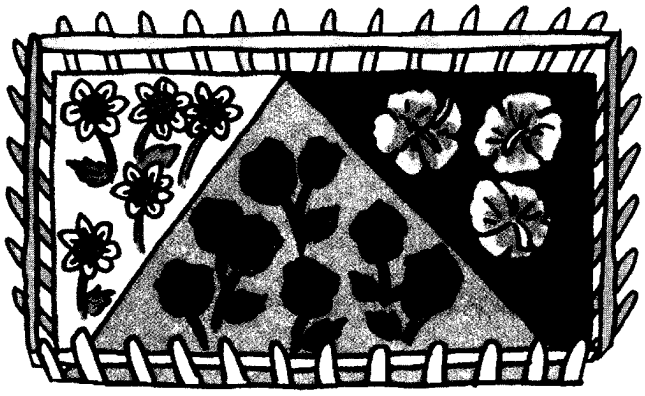
The height of a triangle is perpendicular to its base.

Any of the three sides of a triangle can be chosen to be the base.

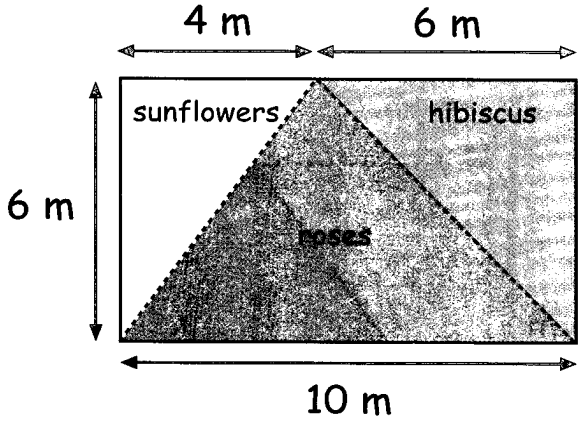
In the right-angled triangle ABC shown on the right, AC is perpendicular to BC. If we choose BC as the base, then AC is the corresponding height.

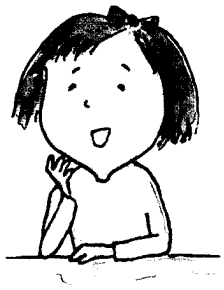
But if AC is the base, then BC is the corresponding height.



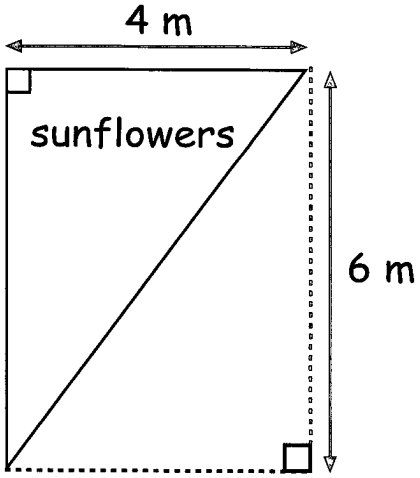


Mrs Li has a plot of land. Find area of each triangular plot that Mrs Li is planning to plant sunflowers, roses and hibiscus.





For sunflowers,
area of the related rectangle
= 4 x 6
= 24 m^2



Area of the triangle

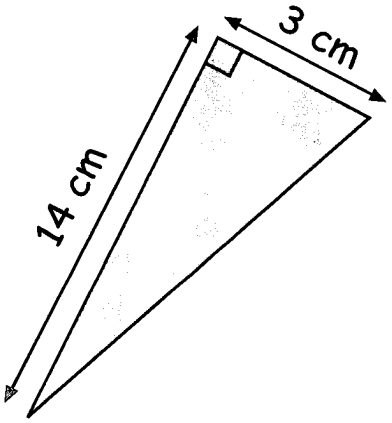
= $\frac{1}{2}$ the area of its related rectangle

= $\frac{1}{2}$ x 24

= 12 m^2

Find the area of each of the following triangles.

1. Base = 14 cm
   Height = 3 cm

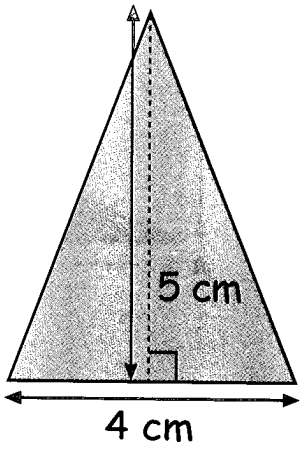


$$\text{Area} = \frac{1}{2} \times \text{base} \times \text{height}$$

$$= \frac{1}{2} \times \boxed{14} \times \boxed{3}$$

$$= \boxed{21} \text{ cm}^2$$

2. Base = 4 cm
   Height = 5 cm



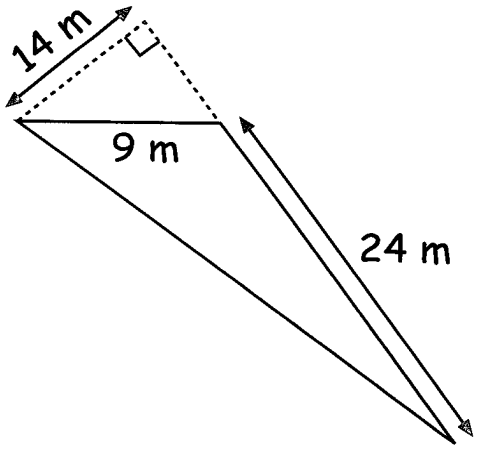
$$\text{Area} = \frac{1}{2} \times \square \times \text{height}$$

$$= \frac{1}{2} \times \square \times \square$$

$$= \square \text{ cm}^2$$

3. Base = $\square$ m

   Height = $\square$ m

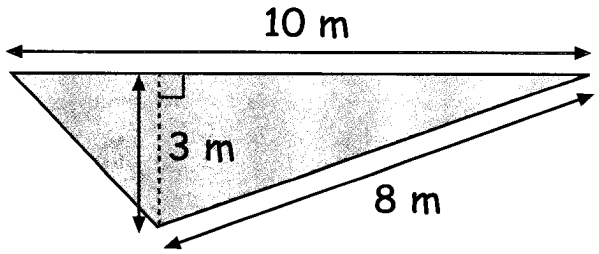


$$\text{Area} = \frac{1}{2} \times \square \times \square$$

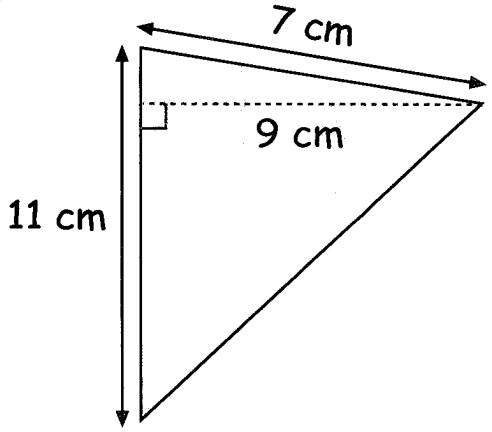
$$= \square \text{ m}^2$$

2. Find the area of each triangle.

(a)

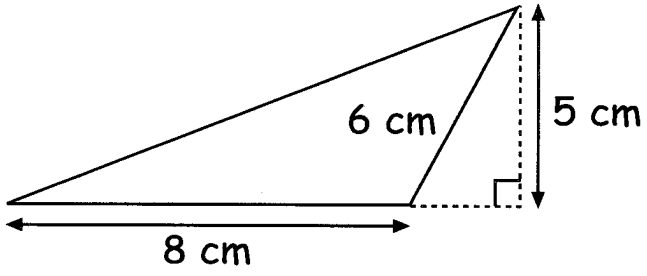


(b)

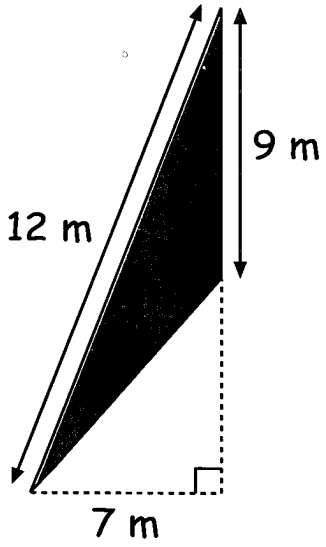


3. Find the area of each triangle.

(a)



(b)




7
Ratio
Do You Know?
How many pears and lemons are there in the basket? How do we compare the number of pears and the number of lemons in the basket?

The ratio of the number of lemons to the number of pears is 6 : 12.

6 : 12 is read as "6 to 12".

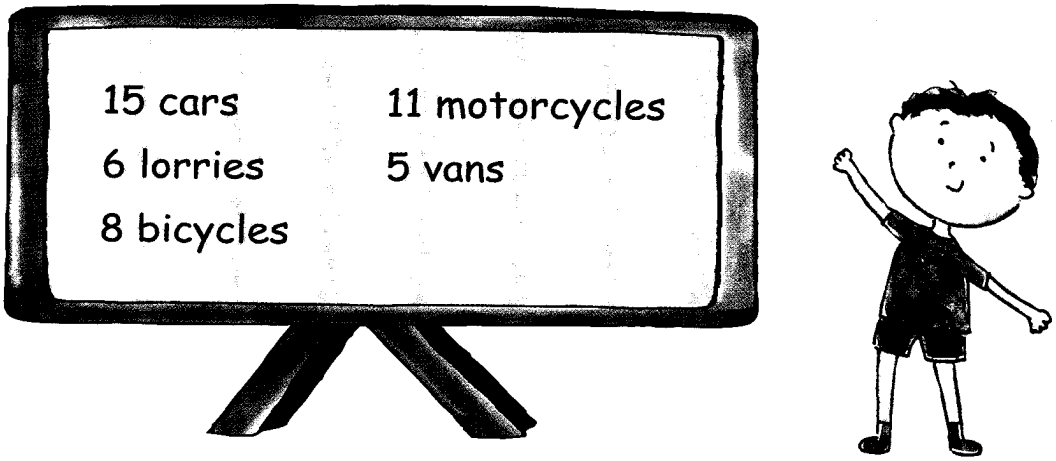
Number of Lemons 	to	Number of Pears 
6	:	12

The ratio of the number of pears to the number of lemons is 12 : 6.

12 : 6 is read as "12 to 6".

Number of Pears 	to	Number of Lemons 
12	:	6

3. The number of vehicles in a carpark is listed below:



The ratio of

(a) the number of motorcycles to the number of vans is ☐ : ☐.

(b) the number of cars to the number of bicycles is ☐ : ☐.

(c) the number of vans to the number of lorries is ☐ : ☐.

(d) the number of 4-wheel vehicles to the number of 2-wheel vehicles is ☐ : ☐.

(e) the number of cars to the number of lorries to the number of motorcycles is ☐ : ☐ : ☐.

(f) the number of bicycles to the total number of vehicles in the carpark is ☐ : ☐.

Let's Try .. Ratio

1.

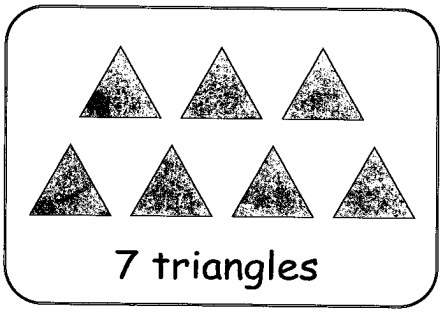
Glasses

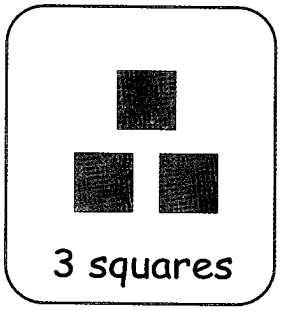
Cups

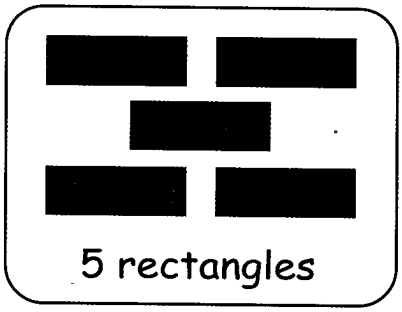
(a) What is the ratio of the number of glasses to the number of cups?

(b) What is the ratio of the number of cups to the number of glasses?

2.







Find the ratio of each of the following.

(a) The number of squares to the number of rectangles.

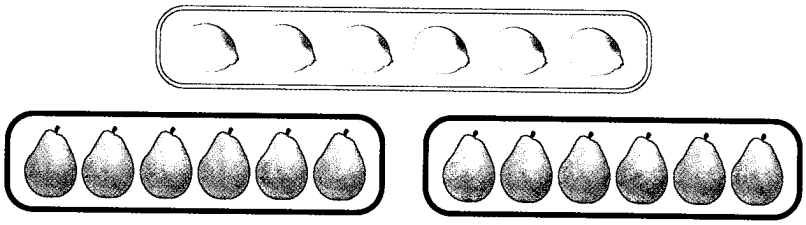
(b) The number of triangles to the number of rectangles.

(c) The number of 3-sided figures to the number of 4-sided figures.

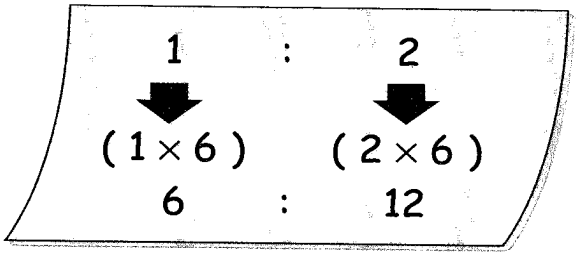
(d) The number of triangles to the number of squares to the number of rectangles.

(e) The number of squares to the total number of shapes.

Case 3: Group the lemons and pears in sixes.



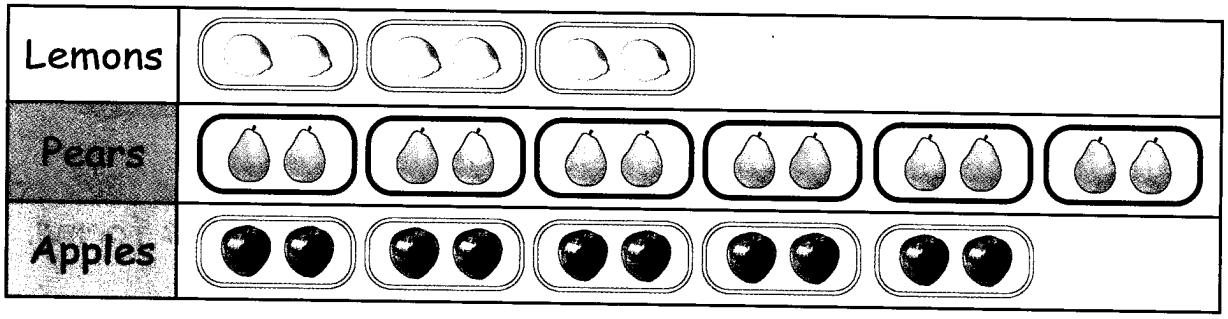
If we compare them by groups of six, the ratio of the number of lemons to the number of pears is 1 : 2.



6 : 12, 3 : 6, 2 : 4 and 1 : 2 all show the ratio of the number of lemons to the number of pears. They are equivalent ratios.

$$6 : 12 = 3 : 6 = 2 : 4 = 1 : 2$$

Similarly, let's look at the ratio of the number of lemons to the number of pears to the number of apples on page 122.
We group the lemons, pears and apples in twos.



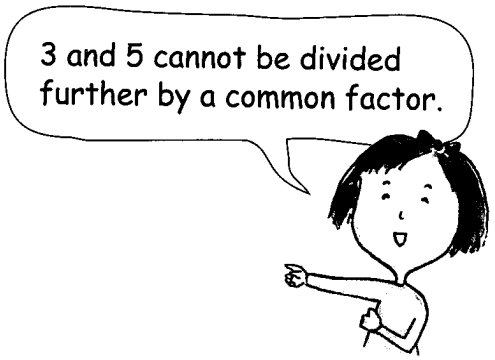
Compare them by groups of 2. The ratio of the number of lemons to the number of pears to the number of apples is 3 : 6 : 5.
Both 6 : 12 : 10 and 3 : 6 : 5 show the ratio of the number of lemons to the number of pears to the number of apples. They are equivalent ratios, too.

$$6 : 12 : 10 = 3 : 6 : 5$$

Simplifying Ratios

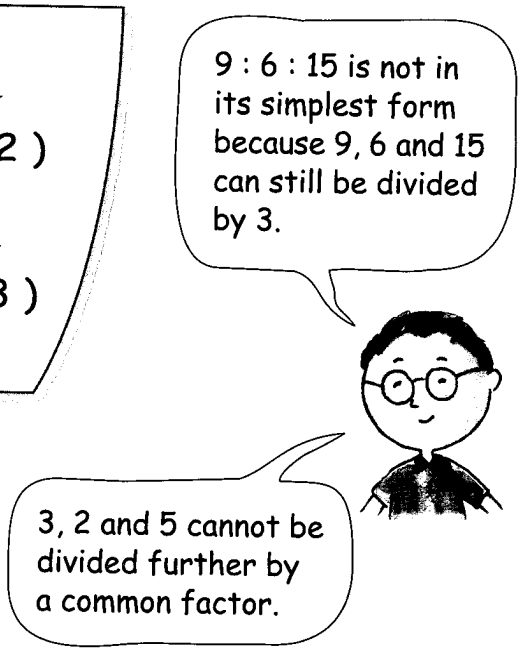
(a)

$$9 : 15$$
$$(9 \div 3) \quad (15 \div 3)$$
$$3 : 5$$

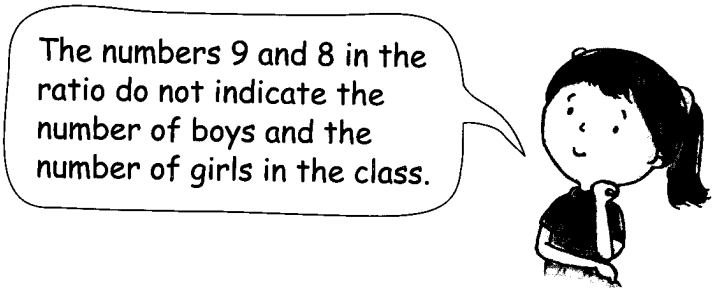


(b)

$$18 : 12 : 30$$
$$(18 \div 2) \quad (12 \div 2) \quad (30 \div 2)$$
$$9 : 6 : 15$$
$$(9 \div 3) \quad (6 \div 3) \quad (15 \div 3)$$
$$3 : 2 : 5$$



(c) Class 5A has 18 boys and 16 girls. The ratio of the number of boys to the number of girls is 9 : 8.



Let's Try .. Equivalent Ratios

1. Simplify the following ratios.

   (a) 6 : 15

   (b) 28 : 8

   (c) 5 : 10 : 15

   (d) 8 : 6 : 12

2. Find the missing numbers.

   (a) 4 : 3 = ☐ : 12

   (b) 15 : 9 = 5 : ☐

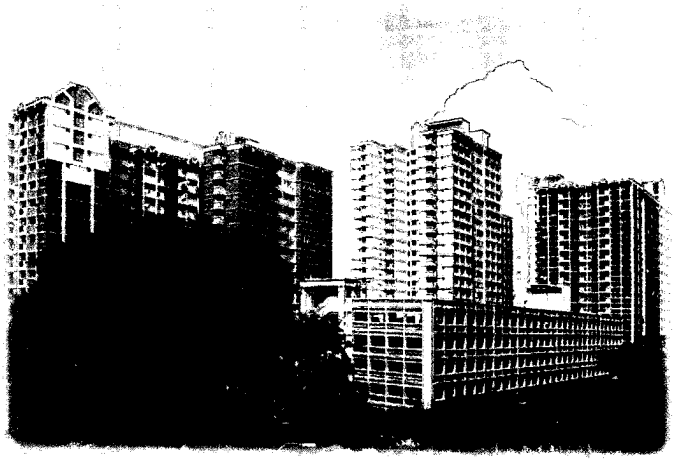
   (c) 3 : ☐ = 12 : 28

   (d) ☐ : 5 = 16 : 20

   (e) 3 : 4 : 5 = 12 : ☐ : ☐

   (f) 2 : 7 : 2 = ☐ : 21 : ☐

2. The ratio of 2-room, 3-room and 4-room flats in an apartment block is 5 : 4 : 2. The number of 4-room flats is 24 units. Find the number of 2-room and the number of 3-room flats in the block.



2-room:

3-room:

4-room:

← 24 →

2 units ⟶ 24

1 unit ⟶ 24 ÷ 2 = 12

5 units ⟶ 12 x 5 = 60

4 units ⟶ 12 x 4 = 48

5 : 4 : 2

(5 x 12) (4 x 12) (2 x 12)

60 : 48 : 24

The number of 2-room flats is 60.

The number of 3-room flats is 48.

Let's Try .. Word Problems

1.

The ratio of the number of oranges in Bag A to the number of oranges in Bag B is 3 : 5. Bag A contains 12 oranges. Find the number of oranges in Bag B.

2. The ratio of the number of rabbits in a bigger cage to a smaller cage is 3 : 2. The bigger cage has 15 rabbits. Find
   (a) the number of rabbits in the smaller cage;
   (b) the total number of rabbits in these two cages.

3. In a class, the ratio of pupils who wear watches to those who do not wear watches is 5 : 3. If 25 pupils wear watches, find
   (a) the number of pupils who do not wear watches;
   (b) the number of pupils in the class.

4. The ratio of the number of goats to the number of cows to the number of chickens in a farm is 2:5:7. The number of cows is 35. What is the number of goats and the number of chickens?