3ᴿᴰ LEVEL
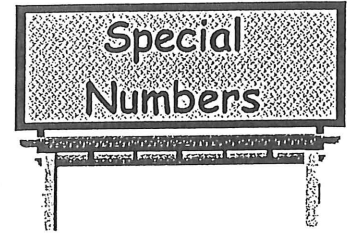Block 4 HW

Chapter 13

Special Numbers

Exercise 1

1. Write down the first six (non-zero) multiples of :-

   (a) 5   (b) 3   (c) 9   (d) 12

2. From the following list of numbers, say which envelopes each number should be placed in.
   (Some numbers can go in more than one envelope).

   10, 12, 13, 16, 20, 24, 25, 28, 29, 30, 32, 35, 39, 40, 42, 45, 50, 51, 52, 56.

multiples of 2	multiples of 3	multiples of 4	multiples of 5	multiples of 6	multiples of 7	multiples of 8	multiples of 9
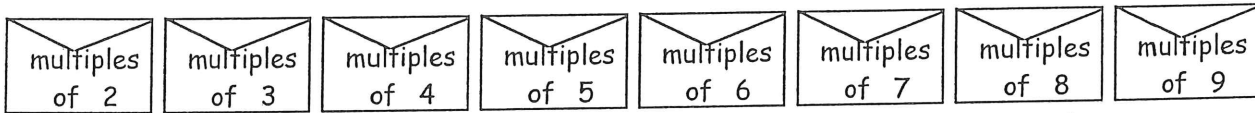
3. Find the lowest common multiple (l.c.m.) of :-

   (a) 2 and 3   (b) 3 and 5   (c) 6 and 9   (d) 5 and 10.

4. Find the l.c.m of :-

   (a) 2, 3 and 4   (b) 2, 4 and 6   (c) 3, 5, and 6   (d) 4, 5 and 7.

5. Baby frog croaks every 3 seconds.
   Mummy frog croaks every 6 seconds.
   Daddy frog croaks every 9 nine seconds.

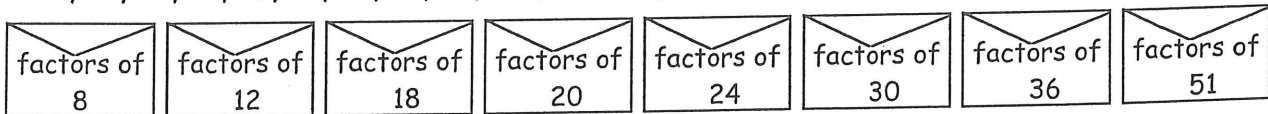   How many seconds pass between them all croaking together ?

Exercise 2

1. Write down the :-

   (a) three factors of 4   (b) two factors of 5   (c) four factors of 27   (d) nine factors of 36

2. From the list of numbers, say which envelopes each number could be placed in.
   (Some numbers can go in more than one envelope).

   1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20.

factors of 8	factors of 12	factors of 18	factors of 20	factors of 24	factors of 30	factors of 36	factors of 51

3. Find the highest common factor (h.c.f) of :-

   (a) 8 and 10   (b) 12 and 15   (c) 29 and 37   (d) 36 and 48.

4. Find the h.c.f. of

   (a) 6, 8 and 12   (b) 8, 12 and 24   (c) 5, 25 and 40   (d) 18, 36 and 54.

5. Find the l.c.m. and the h.c.f. of 24 and 48.

Exercise 3

1. Copy and complete :-   "A prime number has exactly ..... factors".

2. List all the primes numbers between :-   (a) 10 and 20   (b) 50 and 60.

3. From the list of numbers, say which envelope each number could be placed in.
   1,   4,   5,   6,   9,   11,   18,   21,   23,   27,   33,   35,   37,   39,   49,   51.

   Prime numbers

   Not prime numbers

4. Say why each of the following numbers are definitely NOT prime numbers.
   (a) 13572   (b) 55555   (c) 12345   (d) 54320.

5. Make a factor tree and find all the prime factors of :-
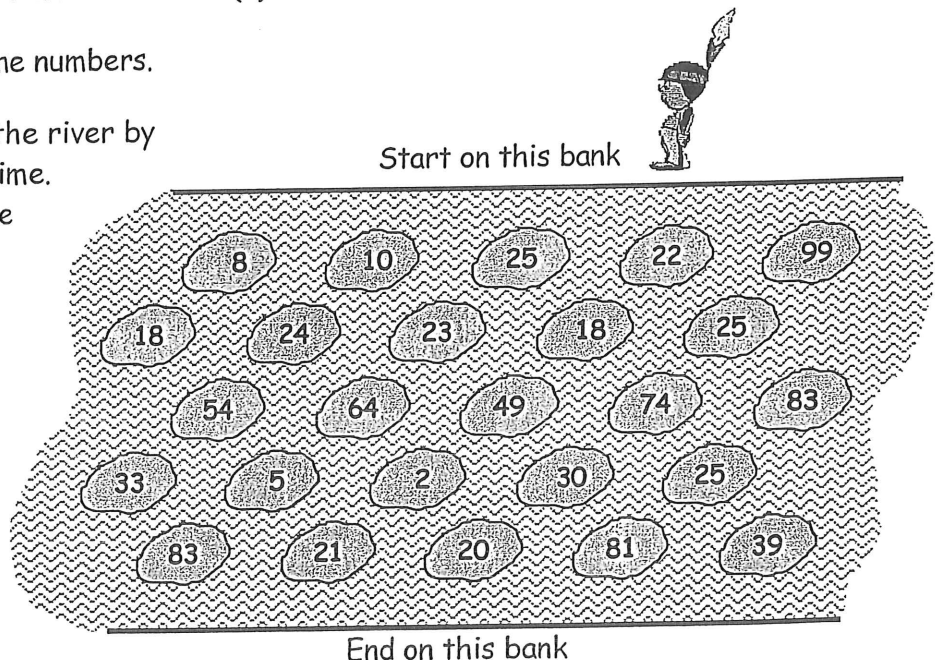   (a) 16   (b) 56   (c) 128   (d) 510.
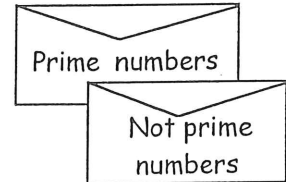
Revision Exercise

1. Write down all the multiples of :-
   (a) 3, between 20 and 40   (b) 8, between 70 and 100.

2. Find the lowest common multiple of :-
   (a) 2 and 7   (b) 6 and 8   (c) 12 and 16   (d) 3, 4 and 6.

3. Write down all the factors of :-
   (a) 13   (b) 20   (c) 27   (d) 40

4. Find the highest common factor of :-
   (a) 10 and 12   (b) 20 and 24   (c) 12 and 48   (d) 12, 18 and 36.

5. Write down the first ten prime numbers.

6. Running Bear can only cross the river by jumping one safe stone at a time. Running Bear will have to take this path across the river.

   Start with a square number.
   Jump to a prime number.
   Jump to a multiple of 7.
   Jump to a _new_ prime number.
   Jump to a factor of 15.
   Jump to a new prime number.

   Write down the list of numbers to safely cross the river.

   Start on this bank

   8   10   25   22   99

   18   24   23   18   25

   54   64   49   74   83

   33   5   2   30   25

   83   21   20   81   39

   End on this bank

Types of Numbers

Calculators should **not** be used anywhere in this Chapter unless you are otherwise instructed.

Exercise 1

(In the following exercises, disregard the **TRIVIAL** multiple 0)

1. (a) List the first 8 multiples of 6.

   (b) List the first 4 multiples of 13.

   (c) List all the multiples of 5 between 19 and 41.

   (d) List all the multiples of 7 between 80 and 110.

2. (a) List the first 12 multiples of 3.

   (b) List the first 10 multiples of 4.

   (c) List the common multiples of 3 and 4.

   (d) Write down the lowest common multiple (l.c.m.) of 3 and 4.

3. Find the l.c.m. of :–

   (a) 4 and 5   (b) 5 and 6   (c) 2 and 7   (d) 10 and 12

   (e) 2, 4 and 6   (f) 4, 5 and 6   (g) 3, 5 and 7   (h) 6, 7 and 8.

4. In a musical score, three clarinets begin by hitting a B^b (B flat) as the first note.

   From this note,

   • the first clarinet hits the B flat note every 4 beats,

   • the second clarinet hits the B flat note every 5 beats,

   • and the third clarinet hits the B flat note every 10 beats.

   (a) After how many beats will all three clarinetists hit the B flat note at the same time again ?

   (b) If the musical score lasts for 300 beats, how many times will all three clarinets hit the B flat note simultaneously (at the same time) ?
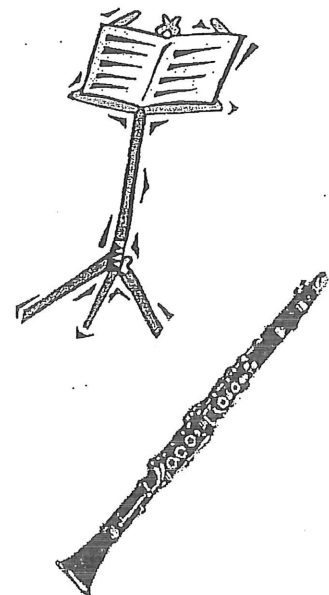
Exercise 2

1. List all the factors of :-

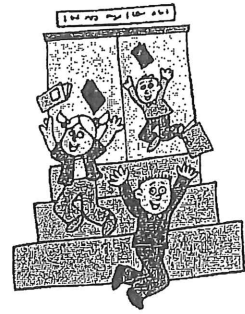   (a) 10   (b) 15   (c) 23.

2. (a) List all the factors of 12.

     (b) List all the factors of 20.

     (c) List all the common factors of 12 and 20.

     (d) Write down the highest common factor (h.c.f.) of 12 and 20.

3. Find the h.c.f. of :-

     (a) 8 and 10   (b) 16 and 24   (c) 20 and 28   (d) 30 and 45
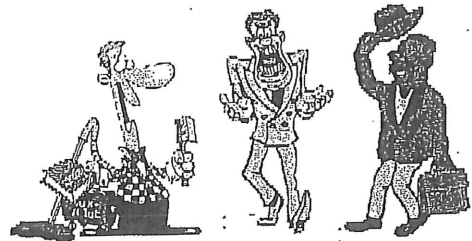
     (e) 16 and 80   (f) 21 and 36   (g) 35 and 84   (h) 23 and 32

4. Ted, Ned and Zed are salesmen. They all call into the office on the **first day** of each month for a meeting.

     After this,   • Ted comes in every second day,

                    • Ned comes in every third day

                    • and Zed comes in every fourth day.

How many days in August will all three be together in the office ?

Exercise 3

1. (a) Explain why the number thirteen **IS** a prime number.

     (b) Explain why the number nine is **not** a prime number.

     (c) Explain why the number one is **not** a prime number.

2. List all the prime numbers between :-

     (a) 20 and 30   (b) 40 and 50   (c) 90 and 100   (d) 100 and 120

3. Look at the list of prime and composite numbers :-
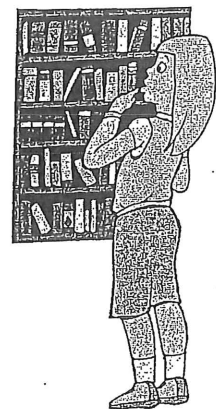
     | 4, 11, 16, 39, 1, 2, 47, 1005 |

From the list write down all the :- (a) prime numbers   (b) composite numbers.

4. Explain why each of the following numbers is not a prime number.
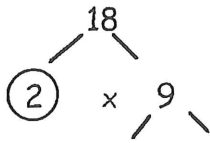
     (a) 1 111 112   (b) 7777   (c) 135 790   (d) (43 x 59).
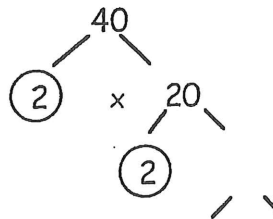
Exercise 4

1. COPY and complete each of the following prime factorisations :-

(a)

(b)

2. Find the prime factorisations of :-

   (a) 12   (b) 30   (c) 32

   (d) 75   (e) 100   (f) 512

   (g) 47   (h) 105   (i) 51.

Revision Exercise

1. (a) List all the multiples of 8 between 30 and 60.

   (b) List all the multiples of 3 between 80 and 100.

2. Find the lowest common multiple of :-

   (a) 4 and 6   (b) 5 and 8   (c) 3 and 7

   (d) 2, 3 and 6   (e) 3, 5 and 9.   (f) 2, 3, 4 and 5.

3. List all the factors of :-

   (a) 18   (b) 29   (c) 32.

4. List the highest common factor of :-

   (a) 9 and 15   (b) 100 and 225   (c) 12, 20 and 36.

5. List all the prime numbers between :-

   (a) 10 and 20   (b) 60 and 70   (c) 80 and 90.

6. Find the prime factors of :-

   (a) 33   (b) 125   (c) 360.

Chapter 59
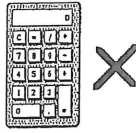
Pythagoras

Calculators should <u>not</u> be used anywhere in this Chapter unless you are otherwise instructed.

Exercise 1

1. Find :-

   (a) 3^2 (b) 5^2 (c) 2^2 (d) 1^2 (e) 10^2

   (f) 9^2 (g) 11^2 (h) 12^2 (i) 20^2 (j) 100^2

   (k) $(\frac{1}{2})^2$ (l) $(\frac{1}{3})^2$ (m) $(\frac{1}{5})^2$ (n) $(0.1)^2$ (o) $(0.01)^2$.

2. Calculate the area of a square with side :-

   (a) 5 cm   (b) 10 cm   (c) 7 mm   (d) 0·5 m   (e) 1 km.

Exercise 2

1. Find :-

   (a) $\sqrt{36}$ (b) $\sqrt{25}$ (c) $\sqrt{100}$ (d) $\sqrt{169}$ (e) $\sqrt{4}$

   (f) $\sqrt{225}$ (g) $\sqrt{10000}$ (h) $\sqrt{900}$ (i) $\sqrt{1600}$ (j) $\sqrt{1}$.

2. Use a calculator and write down to two decimal places :-

   (a) $\sqrt{20}$ (b) $\sqrt{50}$ (c) $\sqrt{56}$ (d) $\sqrt{179}$ (e) $\sqrt{14\cdot4}$.

3. Calculate the length of the side of a square with area :-

   (a) 49 cm^2 (b) 81 cm^2 (c) 9 m^2 (d) 1 mm^2 (e) 0.25 m^2.
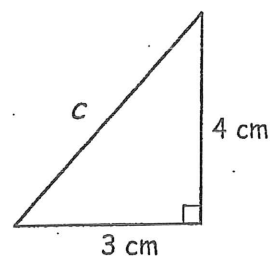
Exercise 3 & 4

1. Use Pythagoras' Rule to calculate the length of the hypotenuse in this triangle :-

   => $c^2 = a^2 + b^2$

   => $c^2 = 3^2 + \ldots$

   => $c^2 = 9 + \ldots = \ldots$

   => $c = \sqrt{\ldots} = \ldots$ cm
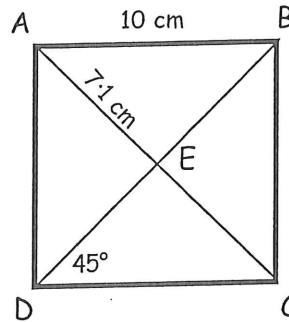
Chapter 18

Quadrilaterals

Exercise 1

1. Make a list of 8 of the important properties of a square.

2. (a) Make a neat sketch of the square shown.

   (b) Fill in the sizes of every side and angle.

3. A square has a perimeter of 20 cm.

   Calculate the length of each side.

4. A square has an area of 49 cm^2.

   Calculate the length of each side.

5. Look at the square in question 2.

   (a) Write down the size of the reflex angle AED.

   (b) Name three other reflex angles in the figure which are the same size as this one.

6. The perimeter and area of a particular square have the same numerical value.

   What must the length of each of its sides be ?

A   10 cm   B

7.1 cm

E

45°

D   C

Exercise 2

1. Make a list of at least 4 of the properties of a rectangle which make it different from a square.

2. (a) Make a neat sketch of the rectangle shown.

   (b) Fill in the sizes of every side and angle.

3. Make three different sketches of rectangles each having a perimeter of 24 cm.

4. Make sketches of 3 different rectangles, each of which has an area of 24 cm^2.

E   8 cm   F

5 cm

J   6 cm

53°

H   G
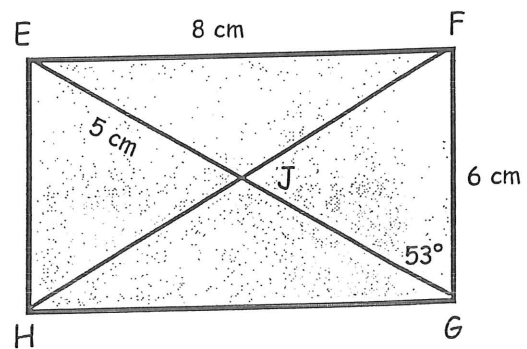
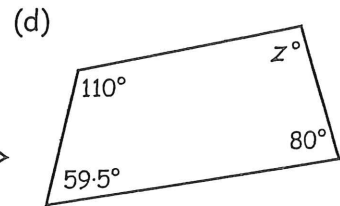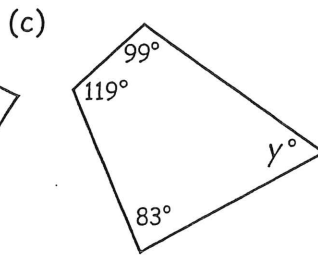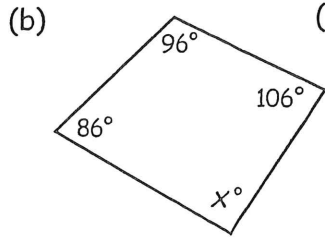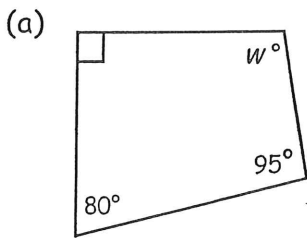5. In this diagram ∠RSW = 37° and ∠VUW = 52°

Make a fairly large sketch of the figure
and fill in the sizes of all the angles.
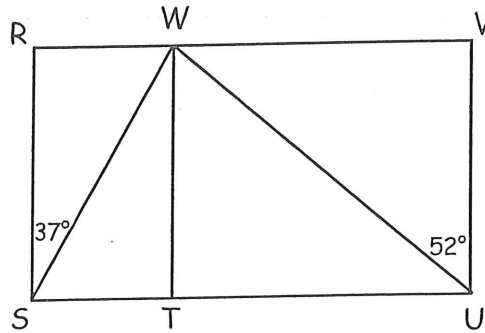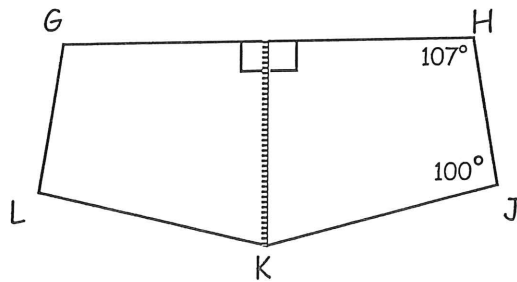

Exercise 3

1. Copy and complete :-   "The four angles of a quadrilateral always add up to ...."

2. Calculate the values of w, x, y and z in the following quadrilaterals :-
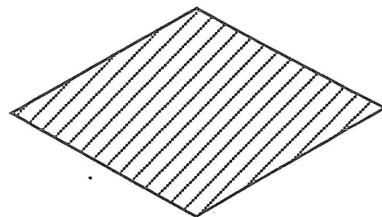
(a) (b) (c) (d)

3. Two congruent quadrilaterals are used
to create a shop sign.

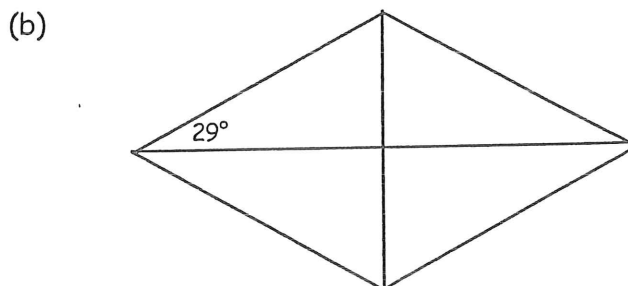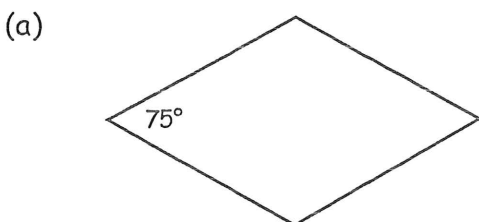Calculate the size of angle JKL.

Exercise 4

1. Make a list of at least four of the properties of a
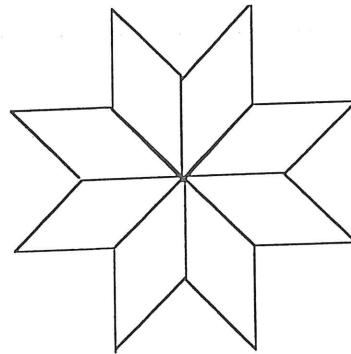rhombus which make it different from a square.

2. Draw a rhombus with diagonals 10 cm and 6 cm.

3. Sketch each of the following rhombii and fill in the sizes of all the missing angles :-
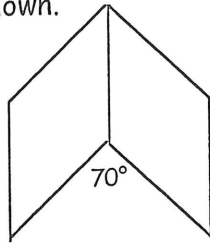
(a)   (b)

4. Eight identical rhombii are placed
   to make a flower design.

   Sketch one of the rhombii and fill in all its angles.

5. Two identical rhombii are placed as shown.

   Sketch the diagram and
   fill in the sizes of all
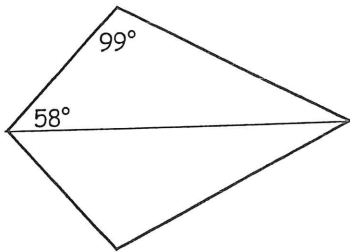   the missing angles.

   70°

Exercise 5

1. Make a list of five properties of a kite that make it different from a square.

2. Sketch 3 different kites each with diagonals 12 cm and 8 cm.

3. Sketch each of the following kites and fill in the sizes of the missing angles :-

   (a)   (b)

   99°

   58°

   26°

   111°
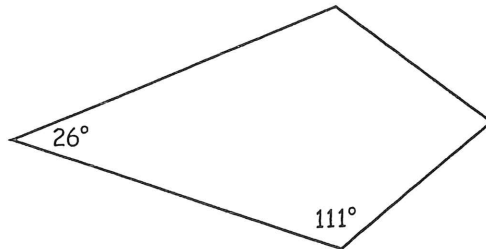
4. Three identical kites are used to
   make the side of a model house.

   Sketch one of the kites and
   determine the size of all of its angles.

5. (a) Calculate the value of x in this kite.

   (b) Now sketch the kite and fill in the
   sizes of all its angles

   $4x°$

   $x°$

   $3x°$

   $4x°$

Exercise 6

1. Write down 2 properties of a parallelogram which make it different from a rectangle.

2. Sketch each of the following parallelograms and fill in the sizes of all angles and sides :-

    (a)

    H ————— 10 cm ————— G
    111°
    8 cm
    E   F

    (b)

    U   T
    27°
    12·6 cm   6 cm
    45°
    R ——— 7 cm ——— S

3. Make a largish sketch of parallelogram WXYZ
    and fill in the sizes of all of its angles.

    Z   Y
    V
    121°
    57°
    32°
    W   X

4.

    T   V
    118°
    W   M
    S   U
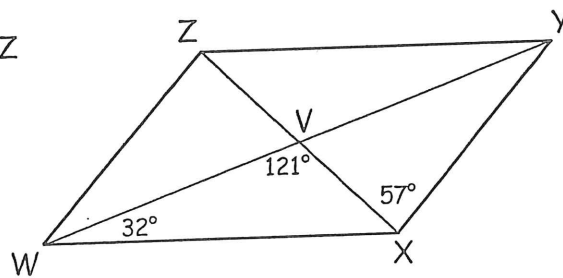
    Two identical parallelograms are shown.
    Line MW is an axis of symmetry.

    Calculate the size of <u>reflex</u> angle SWT

Exercise 7

1. Write down the one property every trapezium has.
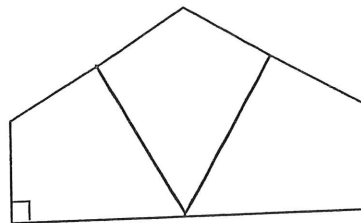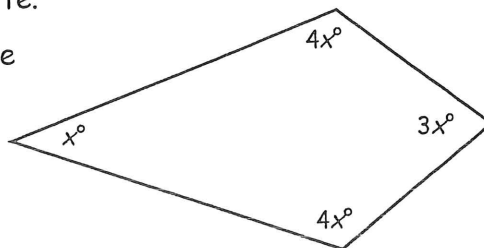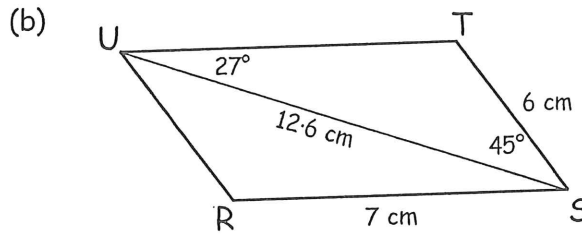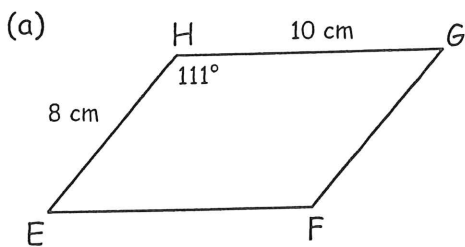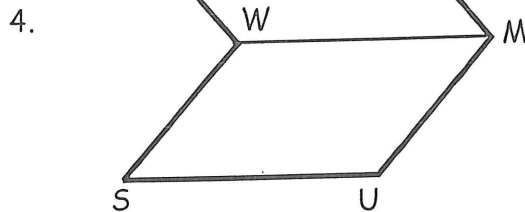
2. Sketch each of the following trapezia and fill in all the sizes of the missing angles :-

    (a)

    107°

    (b)

    63°

    64°
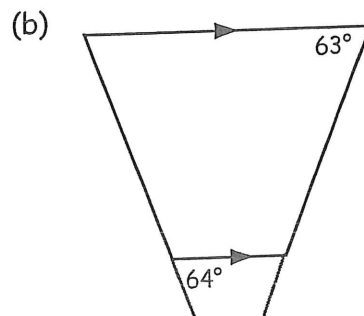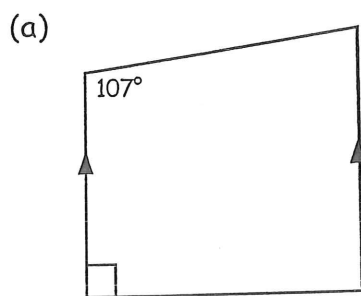
3. A trapezium is formed using an equilateral triangle.

    Sketch the figure and show the size of all the angles.
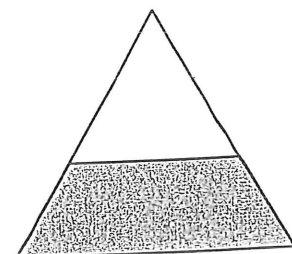
Revision Exercise

1. Without looking back, try to think of as many properties as you can for a :-

    (a) square   (b)   rectangle   (c) rhombus

    (d) kite   (e)   parallelogram   (f)   trapezium.

2. Sketch each of the following and fill in the sizes of as many angles and lengths as possible :-

(a)

D   8 cm   C

5·7 cm

M

square

A   B

(b)

T   25 cm   W

14·6 cm

S

15 cm

59°   rectangle

Q   P

(c)

S

52°

R   T

C

V

rhombus

(d)

W

30°

N   80° C

F

kite

(e)

R   S

44°

W

115°

34°

parallelogram

V   T

(f)

69°

121° trapezium

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Chapter 11
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Patterns
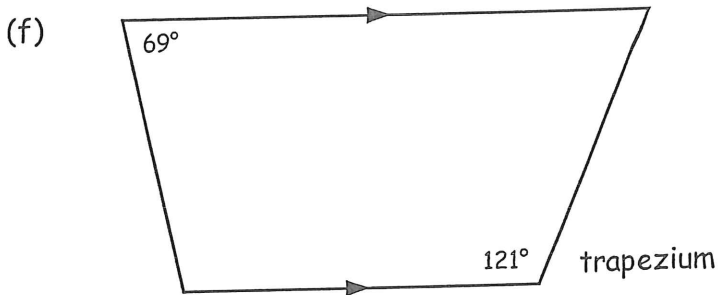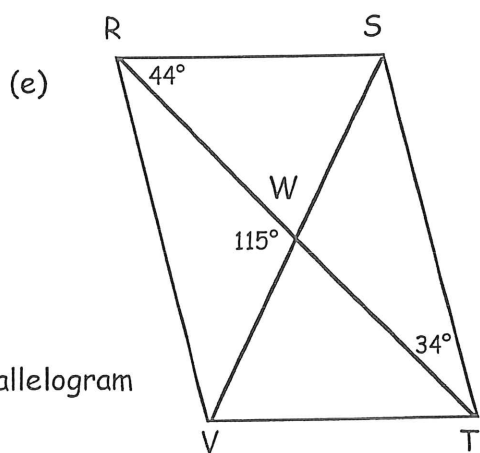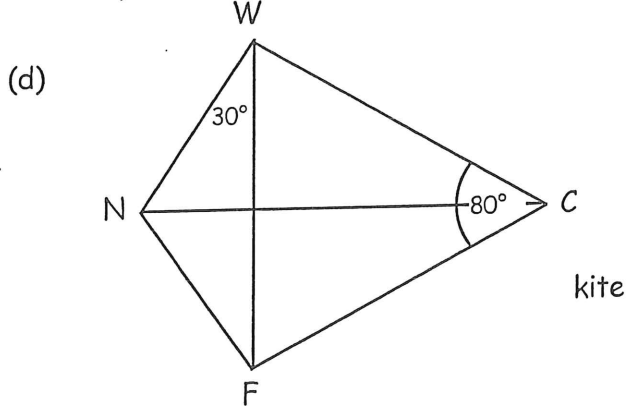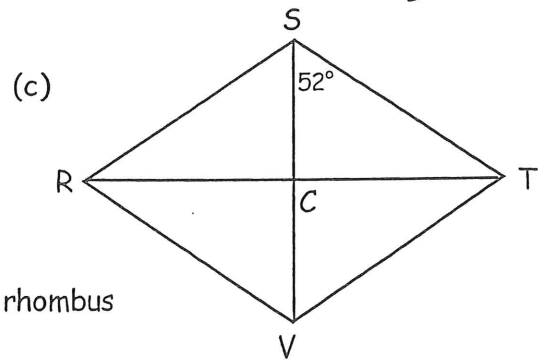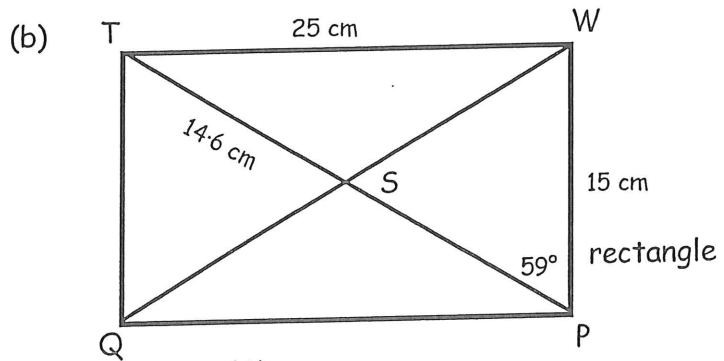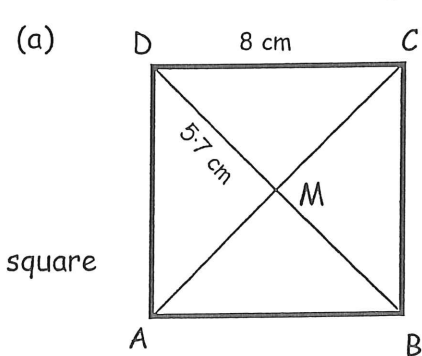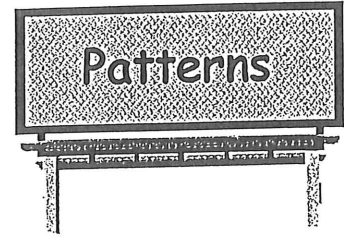
Exercise 1

1. Give a possible rule for each of these sequences :-

   (a) 2, 4, 6, 8, ...

   (b) 5, 10, 15, 20, ...

   (c) 3, 6, 12, 24, ...

   (d) 1, 3, 9, 27, 81, ...

   (e) 64, 32, 16, 8, ...

   (f) 11, 7, 3, –1, –5, ...

   (g) 100, 10, 1, 0·1, ...

   (h) 4, 6, 9, 13·5, 20·25, ...

2. Write the next 3 numbers in each sequence :-

   (a) 11, 14, 17, 20, ...

   (b) 4, 8, 16, 32, ...

   (c) 40, 20, 10, ...

   (d) 100 000, 10000, 1000, ...

   (e) 76, 65, 54, 43, ...

   (f) 5, 6, 8, 11, 15, ...

   (g) 1, 4, 9, 16, 25, ...

   (h) 1, 1, 2, 3, 5, 8, 13, 21, ...

   (i) 1, 3, 6, 10, 15, ...

   (j) 2, 3, 5, 7, 11, 13, 17, ...

Exercise 2

1. List all the square numbers from 100 to 300.

2. List the first 10 triangular numbers.

3. Find :-

   (a) $\sqrt{64}$

   (b) $\sqrt{49}$

   (c) $\sqrt{144}$

   (d) $\sqrt{121}$

   (e) $\sqrt{625}$

   (f) $\sqrt{10000}$.

Exercise 3

1. (a) Copy and complete this table, showing the number of legs on the spiders .

No. of spiders (S)	1	2	3	4	5	6
No. of legs (L)	8	?	?	?	?	?
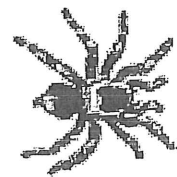
   (b) Copy and complete :- "the total number of legs = ? x the number of spiders".

   (c) Write the formula using symbols connecting L and S.

   (d) Use this "rule" to find the number of legs on 13 spiders.

   (e) How many legs on 21 spiders ?

2. (a) Determine a formula or rule connecting the two letters.

No. of trucks (T)	1	2	3	4	5	6
No. of wheels (W)	6	?	?	?	?	?

(b) Find the number of wheels needed for 11 trucks.

3. (a) Determine a formula or rule connecting the two letters.

No. of starfish (S)	1	2	3	4	5	6
No. of legs (L)	5	?	?	?	?	?

(b) Find the number of legs for 13 starfish.

4. (a) Determine a formula or rule connecting the two letters.

No. of tricycles (T)	1	2	3	4	5	6
No. of wheels (W)	3	?	?	?	?	?

(b) Find the number of wheels for 17 tricycles.

5. (a) Determine a formula or rule connecting the two letters.

No. of crates (C)	1	2	3	4	5	6
No. of bottles (B)	12	?	?	?	?	?

(b) Find the number of bottles in 11 crates.

Exercise 4

1. A rectangular table seats 6 people, two tables seat 10, three tables seat .....
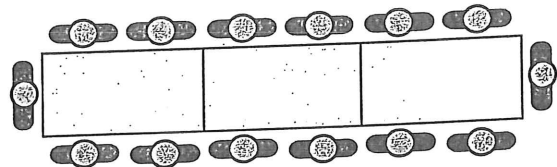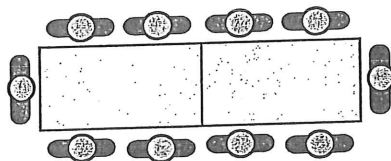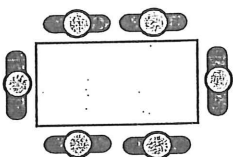
(a) Copy and complete the table.

No. of tables (T)	1	2	3	4	5	6
No. of people (P)	6	?	?	?	?	?

(b) Write a formula using symbols. (P = ... x T + ...)

(c) Use the formula to find how many people can sit at 12 tables.

HIRE-IT-ALL
£18 to Hire
+
£10 per day

2. (a) Copy and complete the table of van hire charges.

No. of days (D)	1	2	3	4	5	6
No. of £ (P)	28	38	?	?	?	?

(b) Write a formula using symbols.

(c) Use the formula to find the cost of hiring a van for 2 weeks.

3. Write a formula connecting the pairs of letters in each of the tables below :-

(a)

Days (D)	1	2	3	4
Hire cost (H)	20	25	30	35

(b)

Fish (F)	1	2	3	4
Litres (L)	25	53	81	109

(c)

Breaths (B)	5	6	7	8
Heartbeat (H)	15	19	23	27

(d)

(x)	2	4	6	8
(y)	15	25	35	45

Revision Exercise

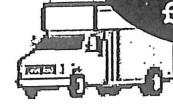1. Write the next two numbers in each sequence :-

(a) 8, 13, 19, 26, ...

(b) 92, 83, 75, 68, 62, ...

(c) 243, 81, 27, ...

(d) $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$, $\frac{1}{16}$, ...

2. Write the square numbers between 300 and 500.

3. Write down the two triangular numbers between 50 and 70.

4. Write a formula connecting each pair of letters in the tables below and find the 12th term of each.

(a)

Days (D)	10	11	12	13
Hire cost (H)	15	17	19	21

(b)

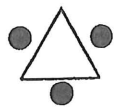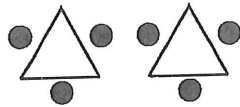| (S)	7	8	9	10
(P)	67	78	89	100

Chapter 53

Linear Patterns

Exercise 1

1. A restaurant has triangular tables. Each table seats 3 customers.

1 table
3 customers

2 tables
6 customers
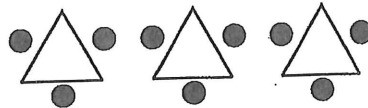
3 tables
9 customers

(a) Copy and complete the table :-

No. of Tables (T)	1	2	3	4	5	6
No. of Customers (C)	3	6	9	?	?	?

3   3   3

(b) For every extra table, how many extra customers are there ?

(c) Copy and complete : -   " number of Customers = ... × number of Tables ".

(d) Write down a formula using symbols to show this. (C = ... × .....).

2. Every rally car has 4 fog lamps fitted.

(a) Copy and complete the table : -

No. of cars (C)	1	2	3	4	5	6
No. of fog lamps (F)	4	8	12	?	?	?

?   ?   ?
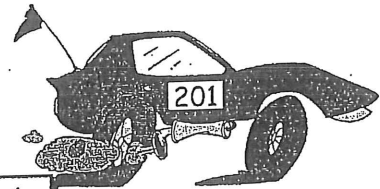
(b) Copy and complete : -   " number of fog lamps   = ... × number of cars ".

(c) Write down a formula using symbols to show this (F = ... × .....).

(d) Use your formula to find the number of fog lamps on 25 rally cars.

3. The table indicates the cost of buying copies of a gardening magazine : -

No. of magazines (M)	3	4	5	6	7	8
Cost in £'s (C)	7·50	10	12·50	?	?	?

?   ?   ?
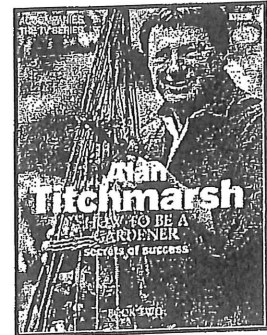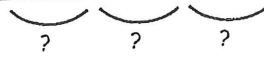
(a) What is the cost of one magazine ?

(b) Write a formula connecting the cost and the number of magazines .

$$\Rightarrow \quad C = \text{... ...}$$

(c) Use your formula to find the cost of 30 magazines.

4. Copy and complete both tables and determine a formula or rule connecting the two letters :-

(a)
No. of jars (J)	1	2	3	4	5	6
No. of sweets (S)	21	42	63	?	?	?

$$S = \text{... } \times \text{ ...}$$
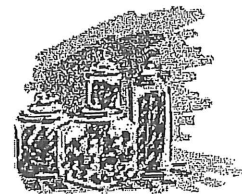
(b)
x	4	6	8	12
y	6	9	12	....

$$y = \text{..........}$$

5. Look at the table shown opposite : -

x	1	2	3	4
y	2	4	6	8

(a) Obtain a formula of the form $y = mx$ connecting the pairs of numbers in the table.

(b) By drawing a set of axis and plotting the 4 points from the table, show that they lie on a line which passes through the origin.

6. Repeat Question 5 for the set of numbers in this table.

x	3	6	9	12
y	1	2	3	4

PATTERNS

Exercise 2

1.   A school dining room is laid out as shown.
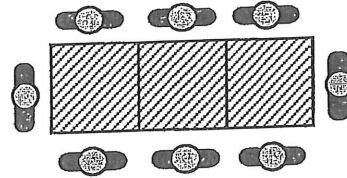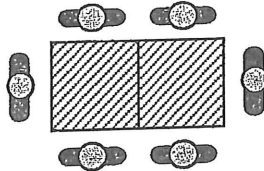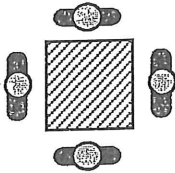
(a)   Draw neatly the next table pattern with 4 square tables.

(b)   Copy and complete the following table : -

No. of tables (T)	1	2	3	4	5	6
No. of pupils (P)	4	6	8	?	?	?

         2   2   ?
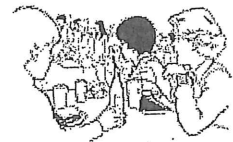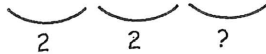
(c)   For every extra table, how many extra pupils can be seated ?

(d)   Write down the formula using **symbols** for calculating the number of
       pupils that can be seated if you know the number of tables :-

                                                              remember the
                                                              correction number
       copy :- $P = ? \times T + ?$

(e)   Use your formula to decide how many pupils can be seated with 12 tables.

(f)   How many pupils can be seated with 50 tables ?

2.   This table shows the cost of hiring a lawn raker for several days.

No. of Days hired (D)	1	2	3	4	5	6
Cost in £'s (C)	9	14	19	?	?	?

         ?   ?   ?
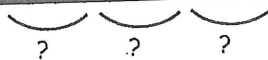
(a)   How much will it cost to hire a lawn raker for (i) 6 days   (ii) 1 week ?

(b)   How much **extra** does it cost for each additional day of hire ?

(c)   Write down the formula for determining the cost of hiring the
       lawn raker.

                         $C = ? \times D + ?$

(d)   How much will it cost to hire a lawn raker for a fortnight ?

(e)   Mr Crawford paid £54 to hire a lawn raker. For how many days had he hired it ?

3.   Copy and complete each table and determine a formula or rule connecting the two letters :-

(a)

Time in minutes (T)	1	2	3	4	5	6
Depth in cm (D)	15	19	23	?	?	?

$D = ... \times ... + ...$

(b)

Velocity (V)	4	5	6	7	8	9
Distance in metres (D)	3	7	11		?	?

$D = ...$

(c)

B	1	2	3	4
A	8	9	10	....

$A = ... \times B + ...$

(d)

Q	2	4	6	8
P	1	7	13	....

$Q = ...$

4.   For each of the tables shown :-

(i)

x	1	2	3	4
y	4	7	10	....

(ii)

x	1	2	3	4
y	2	6	10	....
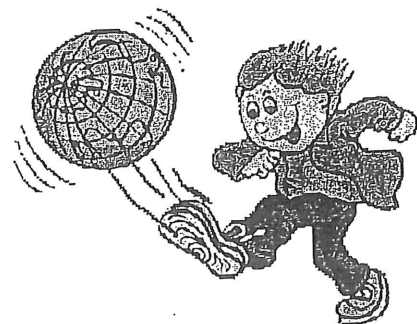
(a) Copy and complete the table.

(b) Make up a formula connecting y and x.

(c) List the set of coordinates formed.

(d) Plot the 4 points on a coordinate diagram.

(e) Join the points with a line.

(f) Write down the coordinates of the point where each line crosses the y-axis.

(g) Comment on the relationship between this point and your formula.

           PATTERNS

Revision Exercise

1. A box contains 5 pancakes.

    (a) COPY and complete the table : -

No. of boxes (B)	1	2	3	4	5	6
No. pancakes (P)	5	10	15	?	?	?

    (b) COPY and complete : -   " number of pancakes = ... x number of boxes ".

    (c) Write down a formula using symbols to show this (P = ... x .....).

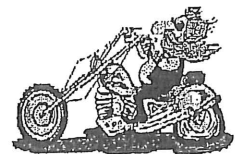   (d) Use your formula to find the number of pancakes in 15 boxes.

2. This table shows the cost of hiring a motor cycle for several days.

No. of Days hired (D)	1	2	3	4	5	6
Cost in £'s (C)	12	20	28	?	?	?

    (a) How much will it cost to hire a motor cycle for (i) 6 days   (ii) 1 week ?

    (b) How much extra does it cost for each additional day of hire ?

    (c) Write down the formula for determining the cost of hiring the motor cycle.

    $$C = ? \times D + ?$$

    (d) How much will it cost to hire a motor cycle for 10 days ?

    (e) Mrs Able paid £116 to hire a motor cycle. For how many days had she hired it ?

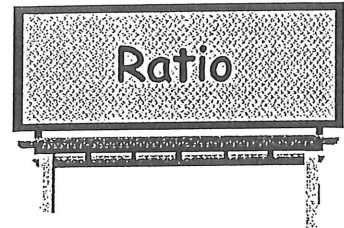3. COPY and complete both tables and determine a formula or rule connecting the two letters :-

    (a)

breadth (b)	1	2	3	4
Area (A)	11	20	29	....

    (b)

g	2	4	6	8
H	30	80	130	....

Chapter 15

Ratio

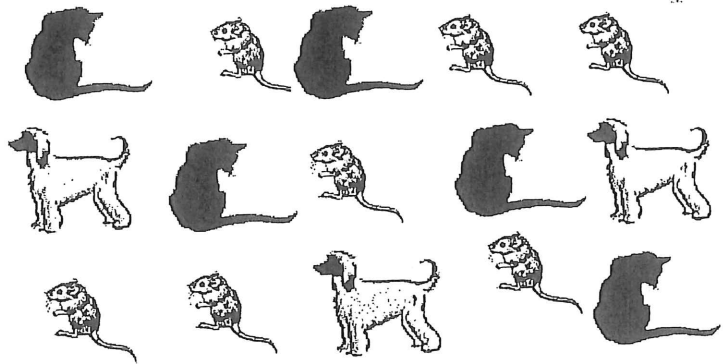## Exercise 1

1. Look at the picture.

   Write down the ratio of :-

   (a) cats to dogs   (b) cats to mice

   (c) dogs to cats   (d) dogs to mice

   (e) mice to cats   (f) mice to animals.

2. George has a lot of pets. He has 11 mice,
   9 goldfish, 4 cats, 3 dogs and a rabbit!

   What is the ratio of :-   (a) mice to goldfish   (b) goldfish to cats

                                    (c) dogs to cats   (d) rabbits to mice ?

3. An orchard has 31 apple trees and 27 pear trees. What is the ratio of :-

   (a) apple trees to pear trees   (b) pear trees to apple trees

   (c) apple trees to total number of trees (d) pear trees to total number of trees ?

4. In December 1999, January 2000 and February 2000, there were 7 rainy days each month.

   Write down the ratio of rainy days : dry days for each of these months.

Exercise 2

1. Simplify each of the following ratios :-

   (a) 4 : 6   (b) 5 : 20   (c) 16 : 2   (d) 3 : 12

   (e) 10 : 50   (f) 15 : 35   (g) 60 : 24   (h) 21 : 35

   (i) 300 : 9000   (j) 18 : 270   (k) 32 : 88   (l) 17 : 51

2. From the picture, write in simplest form the ratio of :-

   (a) oranges to pears

   (b) bananas to pears

   (c) pears to bananas

   (d) pears to oranges

   (e) bananas to fruit.
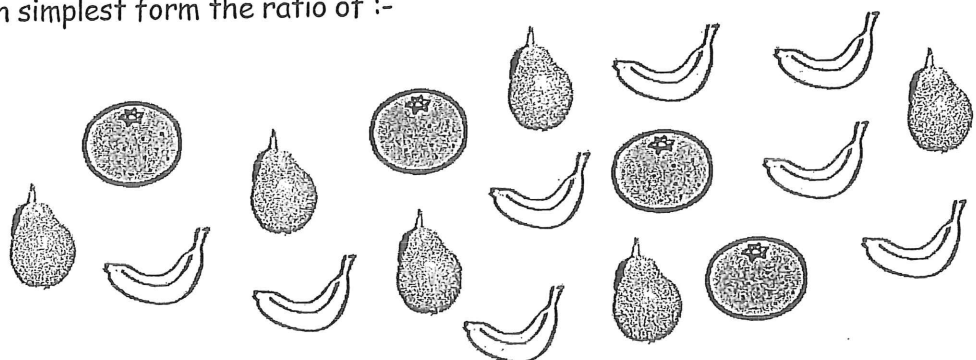
3. On a trip to D & M's there were 8 teachers and 120 pupils. Write in simplest form, the ratio of :-

   (a) teachers : pupils   (b) pupils : teachers   (c) teachers : people   (d) people : pupils.

4. Last Sunday there were 36 home wins (H), 16 away wins (A) and 12 draws (D) in the football league.
Write in simplest form the ratio of :-

   (a) H : A   (b) H : D   (c) A : D   (d) A : total games.

5. At the school disco there were 12 teachers, 160 boys and 180 girls.
In simplest form write the ratio of :-

   (a) teachers : boys   (b) boys : girls   (c) girls : teachers   (d) boys : total attended.

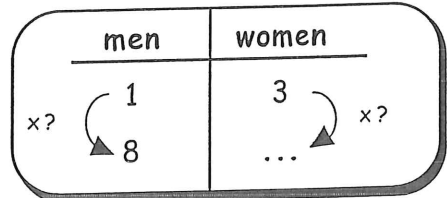6. Farmer Jackson knows you need 4 sheepdogs for every 90 sheep.

   (a) Write in simplest form the ratio of sheep : sheepdogs

   (b) Farmer Jones has 135 sheep. How many sheepdogs should farmer Jones have ?

Exercise 3

1. On a bus the ratio of men to women is 1 : 3.

   If there are 8 men on the bus, how many women are there ?

men	women
1	3
8	...

x?   x?

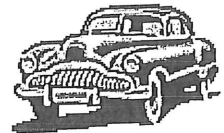2. A fish farm has pike and tench in a 4 : 5 ratio.

   If there are 250 tench, how many pike are there ?

3. The ratio of diesel to petrol cars in a car park is 3 : 5.

   (a) How many petrol cars are there if there are :-

      (i) 6 diesel cars   (ii) 15 diesel cars   (iii) 27 diesel cars ?

   (b) How many diesel cars are there if there are :-

      (i) 15 petrol cars   (ii) 50 petrol cars   (iii) 60 petrol cars ?

4. The local curry shop makes curries to different strengths.
Which strength of curry is made from :-

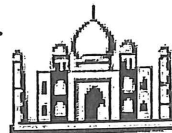   (a) 7 teaspoons of powder and 1 tablespoon of paste.

   (b) 10 teaspoons of powder and 6 tablespoon of paste.

   (c) 6 teaspoons of powder and 22 tablespoon of paste.

   (d) 8 teaspoons of powder and 20 tablespoon of paste.

   (e) 9 tablespoons of paste and 15 teaspoon of powder.

   (f) Aji needs to make a large pot of vindaloo and has 24 tablespoons of paste. How much powder does he need ?

Mix in the ratio

Strength	Curry Powder	:	Paste
Tindaloo !	7	:	1
Vindaloo	7	:	2
Madras	5	:	3
Medium	2	:	5
Mild	3	:	11

5. Pitta bread is made from flour (grams) and water (millilitres) in a ratio of 3 : 20.
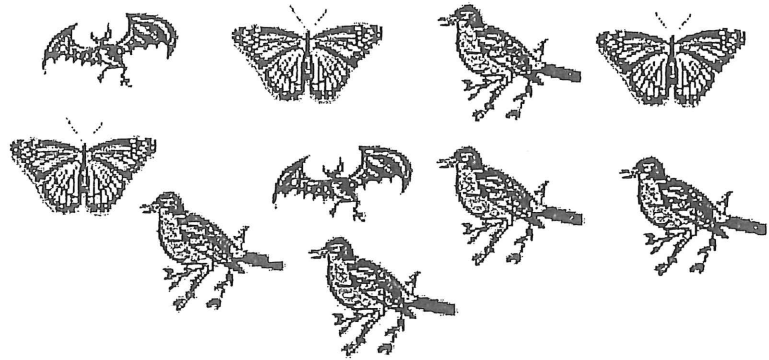
    (a) How much flour is needed for 50 ml of water ?

    (b) How much water is needed for 10·5 g of flour ?

Revision Exercise

1. Look at the picture.

    Write the ratio of :-
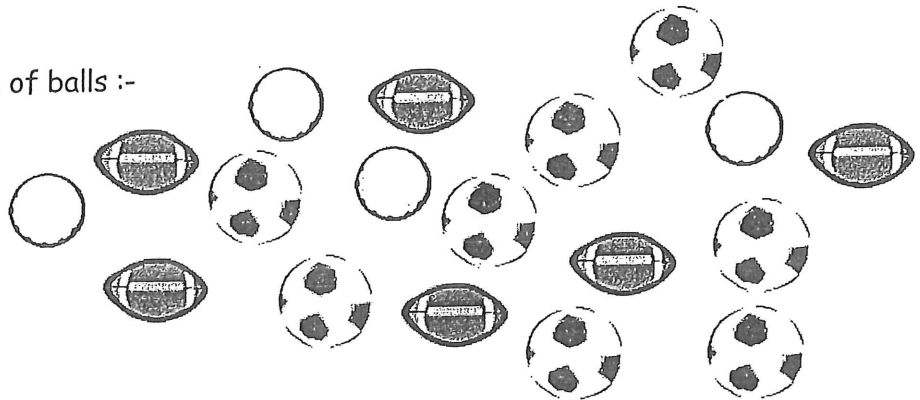
    (a) bats to birds

    (b) birds to butterflies

    (c) butterflies to birds

    (d) bats to butterflies.

2. Look at the picture.

    Write in simplest form the ratio of balls :-

    (a) golf to rugby

    (b) golf to football

    (c) rugby to football

    (d) golf to total

    (e) spherical to total.

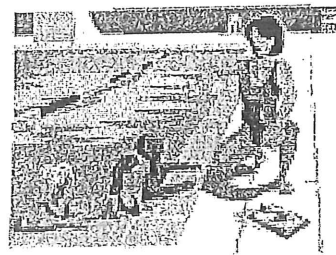3. Alex gets £12 pocket money, Bob £16 and Colin £18 each week.

    Write in simplest form the ratio of pocket money of :-

    (a) Alex : Bob   (b) Colin : Bob   (c) Colin : Alex   (d) Alex : total pocket money.

4. At the swimming pool the ratio of boys to girls is 4 : 5.

    (a) How many boys if there are 45 girls ?

    (b) How many girls if there are 48 boys ?

    (c) If there are a total of 72 children, how many girls are there ?

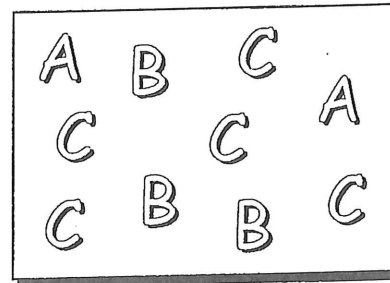5. Write in simplest form $3\frac{1}{2} : 1\frac{1}{2}$.

Chapter 41

✓ 🗖 ✗

Calculators may be
used in this Chapter
(where appropriate)

Ratio & Proportion

Exercise 1/2

1. From the letters shown, write down the ratio of :-

   (a) A : B   (b) A : C

   (c) C : B   (d) B : C

   (e) vowels : consonants

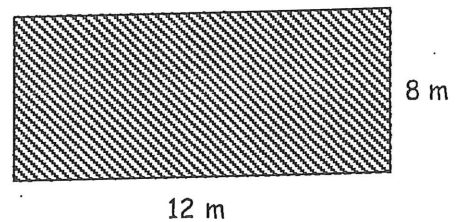2. Copy each ratio and simplify as far as possible :-

   (a) 5 : 10   (b) 12 : 36   (c) 4 : 20   (d) 5 : 35

   (e) 27 : 3   (f) 36 : 16   (g) 100 : 8   (h) 240 : 30

   (i) 25 : 625   (j) 12 : 16 : 24   (k) 8 : 40 : 72   (l) 6 : 81 : 333

3. A rectangular garden measures 12 metres by 8 metres.
   Write down the ratio (in its simplest form) of :-

   (a) length : breadth   (b) perimeter : area

   8 m

   12 m

4. Simplify each of the following to unitary ratios :-

   (a) $\frac{1}{2}$: 6   (b) $\frac{1}{3}$: 9   (c) 12 : 0·2   (d) $\frac{1}{17}$: 10
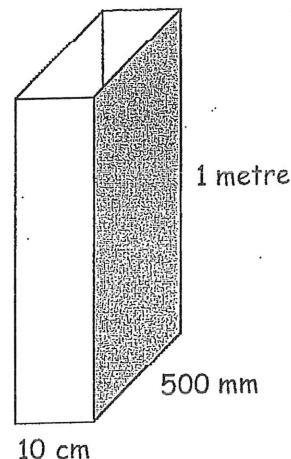
5. Change each quantity to similar units and simplify :-

   (a) $\frac{1}{2}$ kg : 200 g   (b) $\frac{1}{3}$ hour : 10 mins   (c) 50 mm : $\frac{1}{5}$ cm   (d) $\frac{1}{8}$ litre : 250 ml

6. A box with no lid has length 10 centimetres,
   breadth 500 millimetres and height 1 metre.

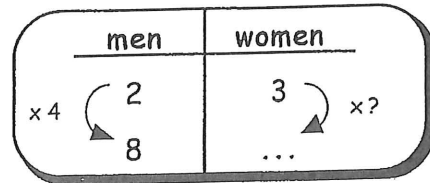   Write in its simplest form the ratio of :-

   (a) length : breadth

   (b) height : volume

   1 metre

   500 mm

   10 cm

Exercise 3

1. On a small aircraft, the ratio of men to women is 2 : 3.

   If there are 8 men on the aircraft, how many women are there ?

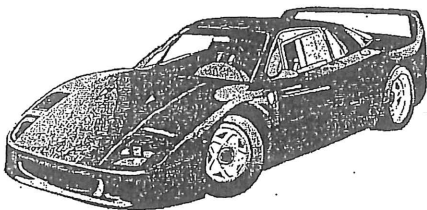| men	women
x 4 ⤵ 2	3 ⤴ x?
8	...

2. The ratio of girls to boys in $3C_2$ is 4 : 5.

   (a) If there are 12 girls, how many boys are there ?

   (b) If there are 20 boys, how many girls are there ?

3.   A model Ferarri has a scale of 1 : 43.

   (a) The model has a tyre diameter of 2 cm.
       What will the tyre diameter be on the Ferarri ?

   (b) The Ferarri has a height of 129 centimetres.
       What is the height of the model ?

4. Farmer Ellis uses the table of ratios to feed his chickens using chicken feed and corn.

   Which feed strength will he get if he mixes :-

   (a) 70 g of feed and 10 g of corn ?

   (b) 210 g of feed and 60 g of corn ?

   (c) 1 kg of feed and 1250 g of corn ?

   (d) 600 g of corn and 1 kg of feed ?

Mix in the ratio		
Strength	Feed :	Corn
Weak	10 :	1
Light	7 :	1
Medium	7 :	2
Strong	5 :	3
Very Strong	4 :	5

5. Farmer Ellis has a 30 g bag of corn.

   How much chicken feed does he need to make *medium strength* feed ?
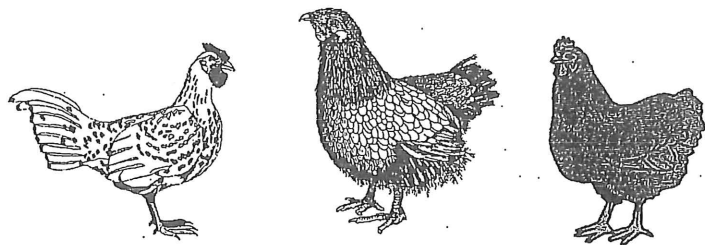
Exercise 4

1. Share £250 between Ann and Kim in the ratio 2 : 3.

   COPY and complete :-

   Total number of shares = 2 + 3 = 5

   Each share = £250 ÷ 5 = £50

   Ann has 2 shares = 2 x £..... = £.......

   Kim has 3 shares = 3 x £..... = £ ......

   Kim

   Ann

   (Check total is £250)

2. Show all your working for each of the following :-

(a) Share £1500 between Bill and Ben in the ratio 3 : 2.

(b) Share 360 sweets between May and Matt in the ratio 5 : 7.

(c) Share 1250 €'s between Tom and Tim in the ratio 7 : 3.

(d) Share ten thousand pounds between Dan and Fran in the ratio 23 : 27.

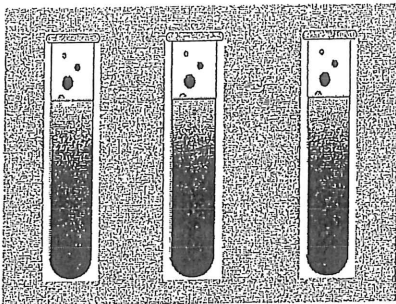3. Every week Jack pays £3, and Jill pays £4 into a church raffle.

If they share the top prize (£140), in the ratio of their stake, how much should each receive ?

4. Ed and Ted win half a million dollars on an internet lottery. They decide to share the money in the ratio 13 : 12.

How much more will Ed receive than Ted ?

5.

A chemist requires a special mix of three chemicals CtP, AgH and RcQ in the ratio of

$$\frac{1}{2} \text{ litre} : \frac{1}{4} \text{ litre} : 2500 \text{ ml}.$$

If the chemist has 1 litre of RcQ, how much of the other chemicals does he require for the correct mix ?

Exercise 5/6

1. (a) The cost of four magazines is £6. Find the cost of one magazine.

   (b) Seven football strips cost £210. Find the cost of one strip.

   (c) Eight sweets cost £2. Find the cost of one sweet.
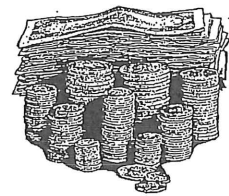
2.

The cost of ten calculators is £50. How much would it cost for :-

(a) one calculator   (b) nine calculators ?

3. A car travels 140 kilometres in 4 hours. Assuming the car travels at the same speed, how far will it travel in :-
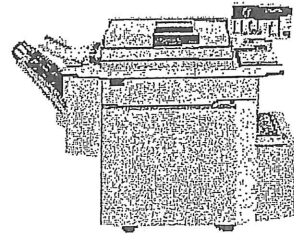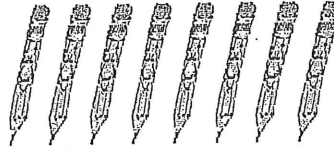
(a) 3 hours   (b) 5 hours   (c) 30 minutes ?

4. A photocopy machine can produce 300 copies in 2 minutes.

How many copies will the machine make in :-

(a) 3 minutes   (b) 11 minutes

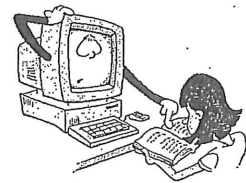(c) 30 seconds   (d) 20 seconds ?

5. (a) 600 pencils cost £24.
       Find the cost of 400 pencils.

(b) A disc spins 3000 times in 8 minutes.
     How many times will it spin in 12 minutes ?

(c) A computer makes three million calculations in 9 seconds.
     How many calculations will the computer make in 12 seconds ?

Exercise 7

1. (a) Copy and complete the table.

(b) Plot each point (1, 4), (2, 8), ...
     on a graph.

No. of sweets	1	2	3	4	5	6
Cost (p)	4	8				

(c) Join the points with a straight line.

(d) Explain why the line must go through the origin.

2. (a) Draw a set of axes and plot the
       points from the table.

(b) Explain how you might check for
     direct proportion without drawing
     axes and plotting points.

x	1	2	3	4
y	2	4	6	8

=> (1, 3), ..., etc.

3. Which of the following tables indicate direct proportion ?

(a)

x	1	2	3	4
y	7	14	21	28

(b)

x	1	2	3	4
y	6	11	17	24
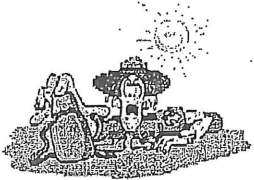
(c)

x	2	4	6	8
y	3	6	9	12

(d)

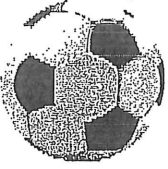| x	2	4	6	8
y	13	17	21	25

Exercise 8

1. If it took two men 6 hours to build a wall, how long would it have taken 3 men ?
   (Remember : more men - less time)

2. If it took 7 park wardens 6 hours to clear away litter, how long would it have taken 3 wardens ?

3. Six men take 6 hours to build a kit car. How long will it take eight men ?

4.
   Nine scouts have eight days rations.
   How many days rations would there then
   be if three more scouts join them ?

5. Oliver and his 5 friends take an hour to wrap all the presents for the church tombola. How long would it have taken if 4 more friends had helped with the wrapping ?

6. Five bees take eight days to make 5 millilitres of honey.
   How many bees would it take to make the same amount in ten days ?

Exercise 9

For each of the following questions show all your working.

1. Tony buys ten stamps for £2·90. How much would he pay for 12 stamps ?

2. Henry can run 4 kilometres in 20 minutes.

   How long would he take to run 5 kilometres at this speed ?

3.
   Five people should each pay £16 to hire a football pitch.

   If only 4 people turned up, how much would each of them then be expected to pay ?

4. What would be the weight of 12 cakes if 20 cakes weigh 1 kilogram ?

5. The perimeter of a room can be surrounded with fifty 0·4 metre wooden edging strips.

   How many strips of edging would be required if each strip was half a metre in length ?

0·4 m
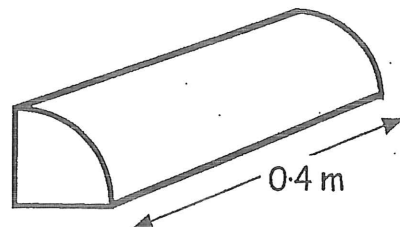
Revision Exercise

1. Look at the picture.
   Write down the ratio of :-
   (a) birds to bees.
   (b) bees to birds.

2. Write down each ratio in its simplest form :-

   (a) 4 : 10   (b) 11 : 121   (c) 30 : 18   (d) 108 : 144
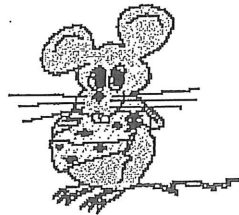
   (e) 40 : 60   (f) $\frac{1}{2}$: 12   (g) 0·8 : 16   (h) 1·7 : 34.

3. The ratio of mice to rats in a factory is 4 : 5.

   (a) How many mice are there if there are 60 rats ?
   (b) How many rats are there if there are 52 mice ?

4. Den and Len share a £40 000 lottery win in the ratio 3 : 5.
   How much will each receive ?

5. Share 1000 euros between Ali, Ben and Cari in the ratio 1 : 4 : 5.

6. (a) Eight bottles of juice costs £4. How much would one bottle cost ?

   (b) Five DVD's cost £80. How much would it cost for four DVD's ?

   (c) If it takes 6 men 5 hours to build a wall, how long would it have taken 4 men ?

7. Five identical videos can hold 800 minutes of playback.
   How many minutes of playback could 4 videos hold ?