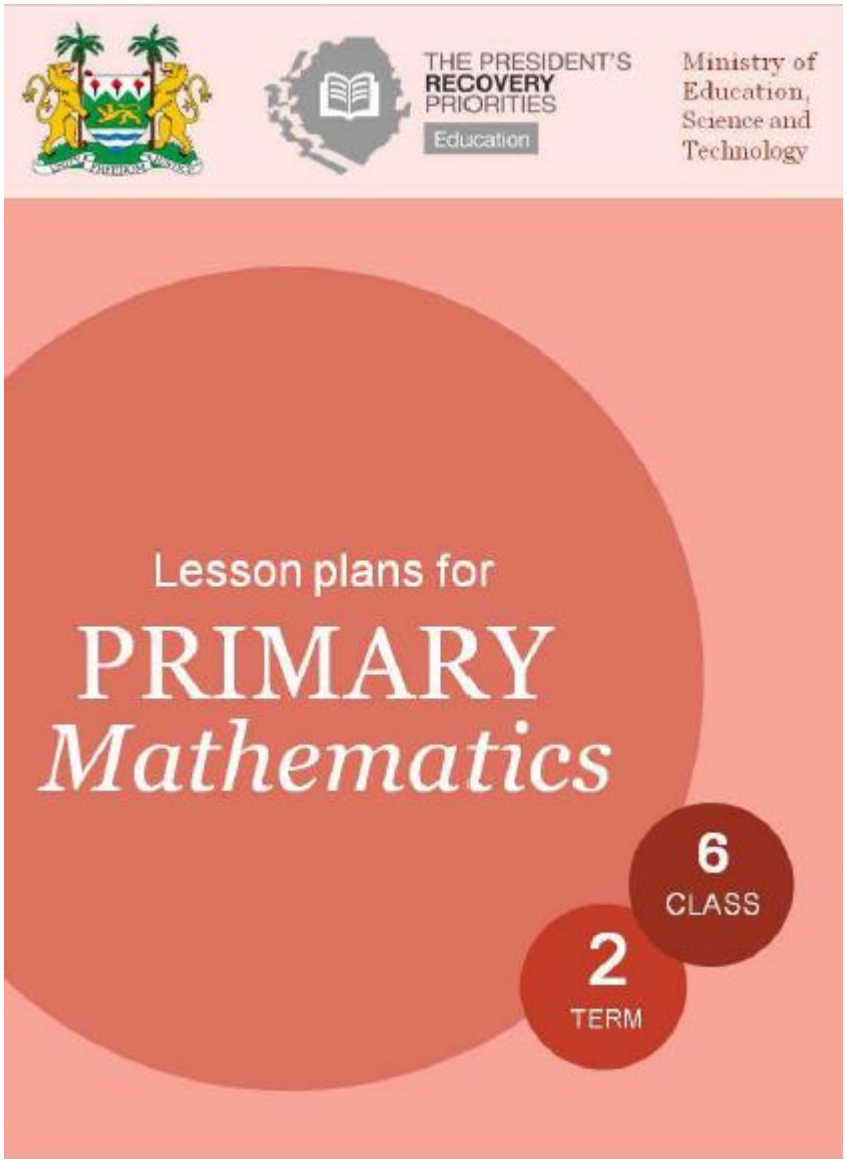

Sierra Leone
WINNING TEAMS: Mathematics

Topic Concept Charts

Primary 6 (Term 2) to support JSS1 Term 2

Leh Wi Lan
November 2022

(Amended March 2023)

WINNING TEAMS: Mathematics

Primary 6 Topic Concept Charts (to support JSS1 pupils) TERM 2

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Primary 6 Topic Concept Charts (to support JSS1 pupils) TERM 2

Topic 10: Ratio and proportion (Term 3 M-06-136 to M-06-150)

Check that you know how to find equivalent fractions.	**Do you understand these words?** Proportion, ratio, quantity, units, fraction, percentage, order, compare, 'reduce to its simplest form'.	*Refer to Primary Maths Class 6 Term 3*

CONCEPTS:

* If two fractions are equivalent, we say that they are in **proportion**. For example, $\frac{2}{3}$ is in proportion to $\frac{8}{12}$.

* The ratios 2 : 3 and 8 : 12 are equal to equivalent fractions, so they are also **proportional**.

* If $\frac{3}{4} = \frac{x}{20}$ then we know that the two fractions are in proportion and we can find *x*.

We can cross-multiply: $3 \times 20 = 4 \times x$

$60 = 4x$

$\frac{60}{4} = \frac{4x}{4}$

$x = 15$

Solve proportion problems

Example 1: If 28 mangoes are shared between two friends A and B in a ratio of 1 : 6, how many mangoes do they each get?

We can use x in a proportion, but always check that it makes sense!

The 28 mangoes are shared into 7 **parts** (or groups of mangoes), 1 part for A and 6 parts for B.

28 ÷ 7 = 4 mangoes.

A gets 4 mangoes and B gets 4 × 6 = 24 mangoes. →

Check: 4 + 24 = 28 mangoes, so we are correct.

Written as a fraction, $\frac{A}{B} = \frac{1}{6} = \frac{4}{24}$. As a ratio A : B is 1 : 6 or 4 : 24.

Using the total, $\frac{A}{total} = \frac{1}{7} = \frac{4}{28}$ As a ratio A : total is 1 : 7 or 4 : 28.

Example 2: Divide 50 pens in a ratio of 1 red to 4 blue. How many blue pens are there?

Written as a fraction, $\frac{Red}{Blue} = \frac{1}{4}$. As a ratio, red : blue is 1 : 4

Using the total, $\frac{red}{total} = \frac{1}{5} = \frac{x}{50}$ As a ratio, A : total is 1 : 5

Cross multiply to get 5x = 50 and so x = 10.

If there are 10 red pens, then there must be 50 – 10 = 40 blue pens.

Reminder:

* A **ratio** compares two quantities of the same kind or units (for example, people, cups, kilometres).
* The **order** of a ratio is important.

Example:

A ratio of 3 cups of milk to every 2 cups of flour in a recipe can be written as **3 : 2**

2 cups of flour to every 3 cups of milk is a ratio of 2 to 3, written as **2 : 3**.

Direct proportion

If two quantities increase in direct proportion, they both increase *at the same rate*.

Example: $\frac{2}{3}$ and $\frac{8}{12}$ are in direct proportion because we *multiplied* 2 and 3 by the same number (4) to get 8 and 12. $\frac{2 \times 4}{3 \times 4} = \frac{8}{12}$.

Inverse proportion

If one quantity increases at the same rate as another quantity decreases, then they are inversely proportional.

Example: If 3 people paint a wall in 2 days, it will take 6 people only 1 day to paint the wall.

The number of people is doubled when the time is halved

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Primary 6 Topic Concept Charts (to support JSS1 pupils) TERM 2

Topic 10: Ratio and proportion

Exercise:

1. Solve for x to find the equivalent fractions:

   a. $\frac{3}{4} = \frac{x}{16}$ b. $\frac{4}{8} = \frac{8}{x}$ c. $\frac{4}{5} = \frac{x}{25}$ d. $\frac{6}{7} = \frac{x}{49}$

2. Solve for x in the following proportions. Write your answers in decimal form correct to two decimal places.

   a. $\frac{5}{x} = \frac{10}{21}$ b. $\frac{15}{8} = \frac{9}{x}$ c. $\frac{5}{6} = \frac{1}{x}$ d. $\frac{5}{8} = \frac{x}{28}$

3. Solve problems using equivalent ratios

   a. A cookie recipe uses $\frac{2}{3}$ of a cup of oil to make 12 cookies. Zinab wants to make 60 cookies. How much oil does he need?

   b. Fatama provides sandwiches for children at the school. She cuts 11 slices of bread from one loaf of bread. If she needs 286 slices, how many loaves of bread does she need?

4. Write these ratios in their simplest form.

   a. 16 : 28 b. 3 : 18 c. 15 : 5 d. 50 : 650

5 a. Divide Le 950,000 in a ratio of 3 : 5.

   b. Divide 56 plantains into a ratio of 8 : 6.

   c. Divide 28 kg of beans into a ratio of 2 : 5.

6. Solve these direct proportion problems.

   a. 25 kg of beans cost Le 35,300. How much would 60 kg of beans cost?

   b. Jusu drives 180 km in 2 hours. At the same rate, how far will he be able to travel in 8 hours?

   c. A rainstorm produced rainfall of 0.75 inches per hour. How many hours would it take to get a rainfall amount of two feet (1 foot = 12 inches)?

   d. Marrah can read 8 pages in 10 minutes. How long would it take her to read a book of 150 pages at the same rate? Write your answer in hours and minutes and round to the nearest minute.

7. If 4 builders can build a house in 6 weeks, how long would it take 8 builders to build the house, at the same rate?

Check your answers:

1a. x = 12 b. x = 16

c. x = 20 d. x = 42

2a. x = 10.50 b. x = 4.80

c. x = 1.20 d. x = 17.50

3a. 60 ÷ 12 = 5 or 12 × 5 = 60

$\frac{2}{3} \times 5 = \frac{10}{3} = 3\frac{1}{3}$ cups of oil.

b. $\frac{1}{11} = \frac{x}{286}$ x = 26 loaves of bread.

4a. 16 : 28 = 4 : 7 b. 3 : 18 = 1 : 6

c. 15 : 5 = 3 : 1 d. 50 : 650 = 1 : 13

5a. 3 : 5 is 8 parts.

Le 950,00 ÷ 8 = 118 750

118 750 × 3 = Le 356 250

118 750 × 5 = Le 593 750

b. 8 : 6 is 14 parts.

56 ÷ 14 = 4 plantains in each part

8 × 4 = 32 plantains; 6 × 4 = 24 plantains

c. 28 kg in 7 parts is 4 kg in each part.

2 kg × 4 = 8 kg and 5 × 4 = 20 kg

6a. $\frac{25\ kg}{60\ kg} = \frac{Le\ 35{,}300}{x}$ x = Le 84,720

b. Jusu drives 90 km in one hour. He drives 90 × 8 = 720 km in 8 hours.

c. 0.75 inch per hour (2 feet = 24 inches)

$\frac{0.75 \text{ inches}}{1 \text{ hour}} = \frac{24 \text{ inches}}{x}$ So x = 32 hours

d. $\frac{8\ pages}{10\ mins} = \frac{150\ pages}{x}$

= 187.5 minutes = 3 hours 7½ minutes

7. $\frac{4\ builders}{8\ builders} = \frac{x\ weeks}{6\ weeks}$

cross multiply: 24 = 8x. so x = 3 weeks

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Primary 6 Topic Concept Charts (to support JSS1 pupils) TERM 2

Topic 11: Percentage, profit and loss, simple interest (Term 2 M-06-101 to M-06-105)

Check that you know:
That percentage is an amount out of 100, written with % sign. For example, 73% = $\frac{73}{100}$ = 0.73

Do you understand these words?
percentage, profit, loss, borrow, owe, total amount, principal, rate

Refer to Primary Maths Class 6, Term 2.

CONCEPTS:

* We can find a percentage of something, for example 25% of 60 km.
25% is a portion of 60 km, which can be worked out using $\frac{25}{100} \times 60$, so $\frac{25}{100} \times 60 = \frac{1}{4} \times 60 = 15$ km
or using $0.25 \times 60 = 15$

Profit and Loss
The amount you start with before considering profit or loss is **100%** of what you have!
* A **profit**, or gain, is greater than 100%. So profit = 100% + (profit)%
Example:
A profit of 22% on Le 300,000. We can use the fraction $\frac{122}{100}$ or the decimal number 1,22.
122% of 300,000 = $\frac{122}{100} \times 300{,}000 = Le\ 366{,}000$

* A **loss** is less than 100%. So loss = 100% – (loss)%
Example:
A loss of 12% of 15 litres of water = (100 – 12)% of 15 = 88% × 15 = 13.2 litres.

Example:
A school has 450 pupils and 60% of them are girls.
How many boys are there in the school?
We know the total population at the school (450) and we know what percentage of pupils are girls (60%).
$\frac{60}{100} \times 450 = 270$.
There are 270 girls, so there must be (450 – 270) boys.
There are 180 boys.
To check, $\frac{180 \text{ boys}}{450 \text{ pupils}} = \frac{18}{45} = \frac{2}{5} = \frac{4}{10} = 40\%$

Simple interest
If you put money into a savings account, you can **earn interest** on the money. If you **borrow** money from a bank, the **interest** is money **you owe** (on top of the money you borrowed).
We can use the formula
A = P(1 + *rt*) where A is the total amount, P is the principal (starting amount), r is the rate or percentage and t is for time.
Example: If I save Le 6,000 for 3 years at 8% simple interest per annum, my total amount saved is A = 6,000(1 + 0.08 x 3) = 6,000(1.24) = Le 7,440

Topic 11: Percentage, profit and loss, simple interest

Exercise

1. Calculate the following percentages:
   a. 31% of 75 m b. 21.5% of 27 kg c. 57% of 57 km
   d. 9% of 100 km e. 84% of 46 kg f. 69% of 30 L
   g. 100% of Le 37,800 h. 150% of 120 m i. 29.5% of 145 g

2. A school has 2,000 pupils and 55% of them are boys. How many girls are there in the school?
   How many boys are there in the school?

3. Find the final distance for a 35% increase on 90 km.

4. Find how much is remaining if there is a 16% loss in 25 acres of farmable land.

5. a. Fatama makes a profit of 16% on Le 345,000. How much money does she have altogether, including profit?
   b. Evaporation causes a loss of 7% from 12 litres of water in an open bucket. How much water is left?
   c. Calculate an increase of 36% on 6.
   d. Calculate a decrease of 57% from 84.

6. A farmer brings 3,500 plantains to the market. She notices that 22% of the plantains are rotten and must be thrown out.
   How many plantains can she keep? How many plantains did she throw away?

7. Binta's father buys a tractor for Le 59 million. 5 years later, he sells it for 25% less than what he paid.
   How much did he sell the tractor for?

Check your answers:

1a. 31% of 75 m = 23.25 m
b. 5.805 kg c. 32.49
d. 9 km e. 38.64
f. 20.7 litres g. Le 37,800
h. 180 m i. 42.8 g

2. 55% of 2,000 = 1,100 boys and 900 girls
   Check: 45% of 2,000 = 900

3. 135% of 90 km = 121.5 km

4. 100% – 16% loss = 84% left
   84% of 25 acres = 21 acres
   Check: 16% of 25 = 4 acres

5a. 116% of Le 345,000 = Le 400,200
b. 93% of 12 L = 11.16 L left
c. 36% of 6 = 2.16 increase
d. 57% of 84 = 47.88 decrease

6. She keeps 78% of 3,500 = 2,730 plantains
   She throws away 22% of 3,500 = 770
   Check: 2,730 + 770 = 3,500

7. 100 – 25 = 75.
   75% of Le 59,000,000 = Le 44,250,000

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Primary 6 Topic Concept Charts (to support JSS1 pupils) TERM 2

Topic 12: Measurement and conversions (Term 1 M-06-056 to M-06-060)

Check that you can: write decimal numbers and whole numbers correctly, using the decimal point and the comma separator	**Do you understand these words?** Convert, feet, inches, millimetres, centimetres, metres, kilometres, decimal system	*Refer to Primary Maths Class 6, Term 1.*

CONCEPTS:

* We can measure length in feet and inches. 1 foot = 12 inches
To convert from feet to inches, multiply by 12. To convert from inches to feet, divide by 12.

Examples:

10 feet = 120 inches 18 inches = 1,5 feet

* In the decimal measuring system, we measure length in millimetres (mm), centimetres (cm), metres (m) and kilometres (km).

1 cm = 10 mm

To convert from centimetres to millimetres, multiply the number by 10.
To convert from millimetres to centimetres, divide the number by 10.

cm **× 10** mm

mm **÷ 10** cm

1 km = 1000 m

To convert from kilometres to metres, multiply the number by 1000.
To convert from metres to kilometres, divide the number by 1000.

km **× 1000** m

m **÷ 1000** km

Examples : 21 cm = 210 mm 2.1 cm = 21 mm 63 mm = 6.3 cm 120 mm = 12 cm
5.1 km = 5,100 m 42 km = 42,000 m 32 m = 0.032 km 790 m = 0.79 km

Notes:

** Remember to use the decimal point to show the part of a number less than 1 (e.g. in 6.3, the digit 3 is for 3 tenths).

** Remember to use the comma as a separator between hundreds and thousands (e.g. 5,100 is five thousand one hundred).

Topic 12: Measurement and conversions

Exercise

1. Convert between metres and kilometres:
   a. 15 km = _____ m b. 407 m = _____ km

2. Convert between millimetres and centimetres:
   a. 34 cm = _____ mm b. 5.6 cm = _____ mm c. 198 mm = _____ cm
   d. 120 mm = _____ cm e. 6.3 km = _____ m f. 17 km = _____ m
   g. 23 m = _____ km h. 863 m = _____ km

3. To convert from centimetres to millimetres, _____ the number by _____.
4. a. To convert 600 km from kilometres to metres, _____ 600 by _____ to get an answer of _____.
   b. To convert 380 mm from millimetres to centimetres, _____ 380 by _____ to get an answer of _____.
   c. To convert 703 m from metres to kilometres, _____ 703 by _____ to get an answer of _____.

5a. To convert from feet to inches, _____ by 12.
 b. To convert from inches to feet, _____ by 12.
 c. 72 inches = _____ feet.
 d. 4½ feet = _____ inches.

Check your answers:

1a. 15 km = 15,000 m
 b. 407 m = 0.407 km
2a. 34 cm = 340 mm
 b. 5.6 cm = 56 mm
 c. 198 mm = 19.8 cm
 d. 120 mm = 12 cm
 e. 6.3 km = 6,300 m
 f. 17 km = 17,000 km
 g. 23 m = 0.023 km
 h. 863 m = 0.863 km

3. To convert from centimetres to millimetres, **multiply** the number by **10**.

4a. To convert 600 km, **multiply** 600 by **1000** to get an answer of **600,000** m.
4b. To convert 380 mm from millimetres to centimetres, **divide** 380 by **10** to get an answer of **38 cm**.
4c. To convert 703 m from metres to kilometres, **divide** 703 by **1000** to get an answer of **0.703 km**
5a. To convert from feet to inches, **multiply** by 12.
5b. To convert from inches to feet, **divide** by 12.
5c. 72 inches = 6 feet
5d. 4½ feet = 48 + 6 = 54 inches

WINNING TEAMS: Mathematics

Primary 6 Topic Concept Charts (to support JSS1 pupils) TERM 2

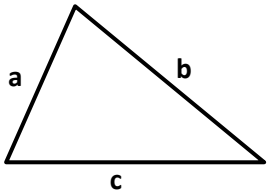
Topic 13: Perimeter and area (Term 2 M-06-081 to M-06-085 and M-06-091 to M-06-095)

Check that you can:	**Do you understand these words?**	*Refer to Primary Maths Class 6, Term 2*
Identify a triangle, a square and a rectangle by the number of sides and the length of the sides	perimeter, area, square units, base, height, perpendicular, irregular shape, triangle, square, rectangle.	

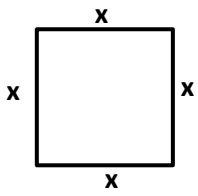
CONCEPTS:

* The **perimeter** of a shape is the total distance around the edges of the shape.

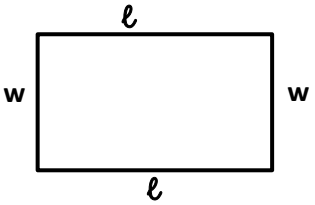
Perimeter of any triangle:
P = a + b + c



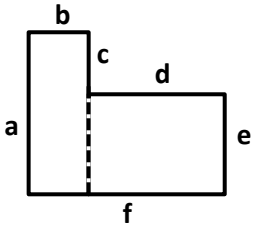
Perimeter of a square:
P = x + x + x + x = 4x



Perimeter of a rectangle:
P = l + w + l + w = 2l + 2w



Perimeter of any irregular shape:
Add up the lengths of all the sides
P = a + b + c + d + e + f



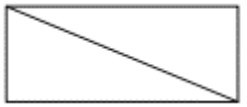
* The **area** of a shape is the amount of space inside the shape.
Area is measured in square units.

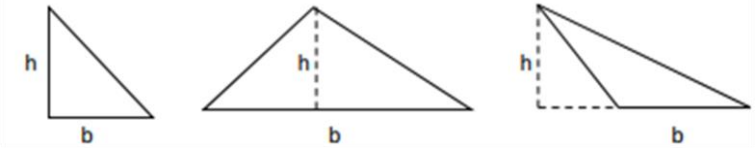
Area of square = x × x = x^2

Area of rectangle = ℓ × w

Area = area of two or more joined shapes

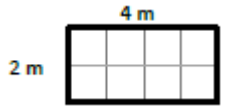
Note: If you use two copies of a triangle, you can fit them together to make a rectangle.
This shows that the area of a triangle is half the area of a rectangle with the same base and height (or length and width).





Area of triangle = ½ base × height = ½ b × h
Use or draw the height that is perpendicular to the base.

Example:
P of rectangle = 2 + 4 + 2 + 4 = 12 m
Area of rectangle = 2 m × 4 m = 8 m^2

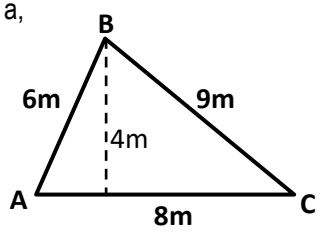


Topic 13: Perimeter and area

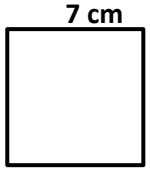
Exercise

1. Calculate the perimeter and the area of the triangle, the square and the rectangle:

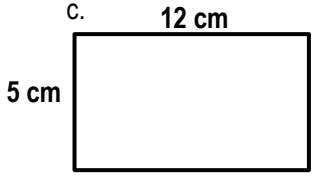
a,



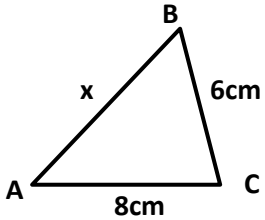
b.



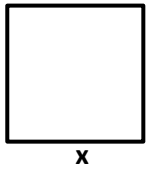
c.



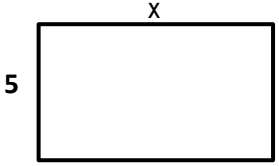
2. Use the given information about each shape to find the missing side.



a. Triangle ABC has a perimeter of 24 cm. Calculate the length of AB.



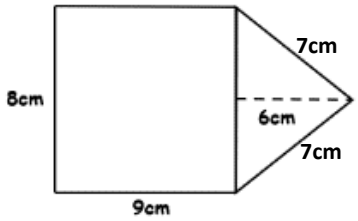
b. The square has a perimeter of 18 cm. Find the value of x.



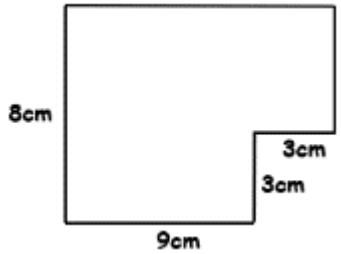
c. The rectangle has an area of 40 cm^2. Find the length of one side.

3. Calculate the perimeter and the area of each of the irregular shapes below.

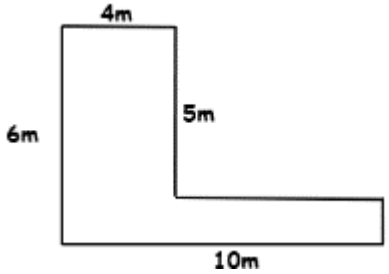
a.



b.



c.



Check your answers:

1a. P of Δ = 6 + 9 + 8 = 23 m
Area of Δ = ½ × 8 × 4 = 16 m^2

b. P of square = 4 × 7 = 28 cm
Area = 7 × 7 = 49 cm^2

c. P of rectangle = 2 × 5 + 2 × 12
= 10 + 24 = 34 cm
A of rectangle = 12 × 5 = 60 cm^2

2a. 6 + 8 + x = 24, so x = 10 cm

b. x = 18 ÷ 4 = 4.5 cm

c. 40 cm^2 = 5 cm × x cm, so x = 8

3. a. P = 8 + 9 + 7 + 7 + 9 = 40 cm
A = (8 × 9) + ½ (8 × 6) = 96 cm^2

b. Long side = 9 + 3 = 12 cm.
Other missing side = 8 – 3 = 5 cm
P = 3 + 3 + 9 + 8 + 12 + 5 = 40 cm
A = 8 × 9 + 3 × 5 = 87 cm^2

c. shortest side = 6 – 5 = 1 m and
other missing side = 10 – 4 = 6 m
P = 6 + 4 + 5 + 6 + 1 + 10 = 32 m
A = 4 × 6 + 1 × 6 = 30 m^2

40°

WINNING TEAMS: Mathematics

Primary 6 Topic Concept Charts (to support JSS1 pupils) TERM 2

Topic 14: Angles, angles in shapes (Term 2 M-06-111 to M-06-115)

Check that you know: how to label and identify angles in shapes	**Do you understand these words?** angle, triangle, quadrilateral, composite shape	110° 110°	*Refer to Primary Maths Class 6, Term 2.*

CONCEPTS:

* The **angles of a triangle** always add up to a total of 180°.

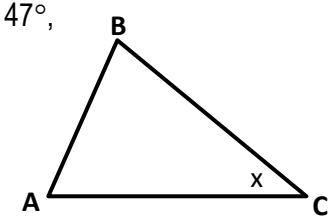
Example 1: In ∆ABC, if A = 58° and B = 47°, we can find the size of angle C.

A + B + C = 180°

58° + 47° + x = 180°

105° + x = 180°

x = 180° – 105° = 75°



Example 2: In ∆ABC, if K = 84° and M and L are equal angles, we can find the size of angles M and L.

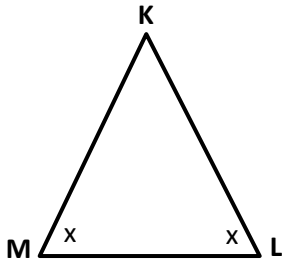
K + L + M = 180°

84° + x + x = 180°

84° + 2x = 180°

2x = 96°

x = 48°



* The **angles of a quadrilateral** add up to 360°.

A quadrilateral is a closed four-sided shape.

Note: *Rectangles and squares are special kinds of quadrilaterals.*

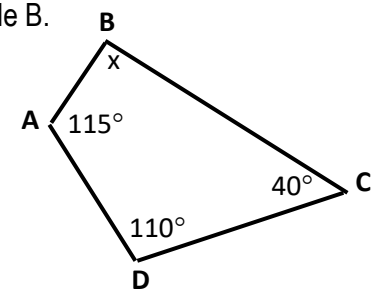
Example: In ABCD, find the size of angle B.

A + B + C + D = 360°

115° + x + 40° + 110° = 360°

265° + x = 360°

x = 360° – 265° = 95°



* **Angles in composite shapes**

Use the angles that you are given. Break down the shape into squares, rectangles or triangles.

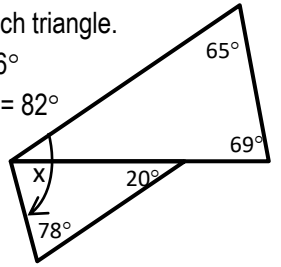
Example: Find the size of the angle x in the composite shape below.

x is made up of the missing angle from each triangle.

In the top triangle, 180° – (65° + 69°) = 46°

In the bottom triangle, 180° – (78° + 20°) = 82°

x = 46° + 82° = 128°

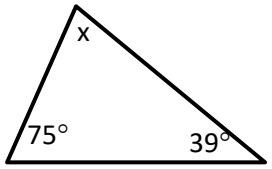


Topic 14: Angles, angles in shapes

Exercise

Do all calculations without using a calculator.

1.



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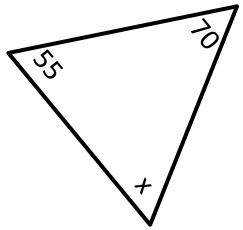

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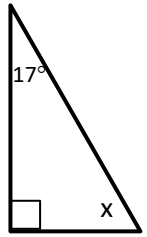

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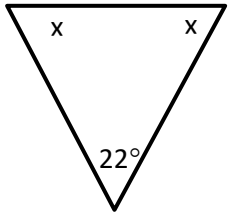

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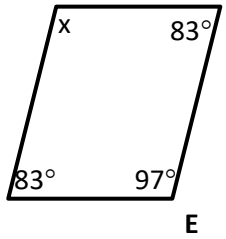

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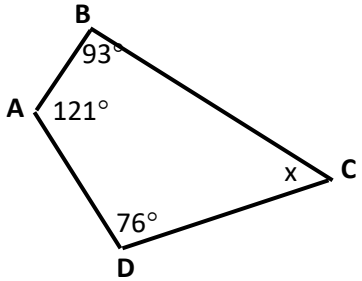

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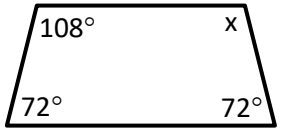

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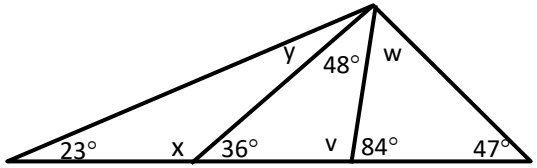

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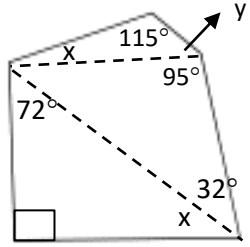


Check your answers:

1. $x = 180° – (75 + 39)° = 66°$
2. $70° + 55° + x = 180°$ so $x = 55°$
3. $17° + 90° + x = 180°$ so $x = 73°$.
4. $22° + x + x = 180°$ so $2x = 158°$ and $x = 79°$.
5. $83° + 97° + 83° + x = 360°$
   $263° + x = 360°$ so $x = 97°$
6. $93° + 121° + 76° + x = 360°$
   $263° + x = 360°$ so $x = 70°$
7. $108° + 72° + 72° + x = 360°$
   $252° + x = 360°$ so $x = 108°$
8. $84° + 47° + w = 180°$ so $w = 49°$.
   $36° + 48° + v = 180°$ so $v = 96°$
   $23° + 47° + y + 48° + w = 180°$ and $w = 49°$.
   $y = 180° – (23° + 47° + 48° + 49°) = 13°$
   $23° + x + 13° = 180°$, so $x = 144°$
9. In the right-angled triangle:
   $90° + 72° + x = 180°$
   $162° + x = 180°$
   $x = 18°$
   Use $x = 18°$ in top triangle:
   $18° + 115° + y = 180°$
   $133° + y = 180°$
   $y = 47°$

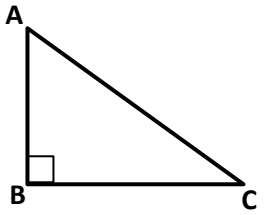
Topic 15: Triangles and straight lines (Term 3 M-06-131 to M-06-135)

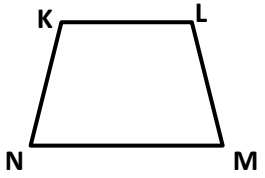
Check that you know: that the angles of a triangle add up to 180°	**Do you understand these words?** acute, obtuse, right angle, straight angle, supplementary	*Refer to Primary Maths Class 6, Term 3.*

CONCEPTS:

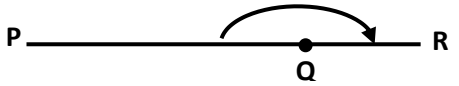
Types of angles

* Angles are names by their size. Angles are bigger, smaller or equal to 90°.
* Angle A < 90°, so it is an **acute angle**. C, N and M are also acute angles.
* Angle K > 90°, so it is an **obtuse angle**. L is also an obtuse angle.
* Angle B = 90°, so it is a **right** angle.

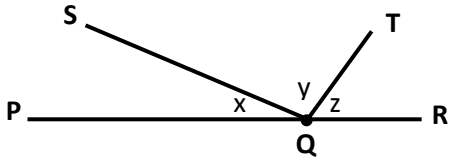




* A **straight angle** is 180°. Angle Q is a straight angle. It makes a straight line.



* The angles x, y and z at point Q add up to 180° and are called **supplementary** angles.
  x + y + z = 180°. Adjacent angles on a straight line are supplementary.



<u>Example 1</u>:

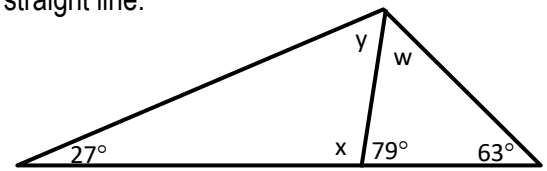
Angle x and 79° are supplementary angles on a straight line.

x + 79° = 180° so x = 101°

x + y + 27° = 180°

101° + y + 27° = 180°

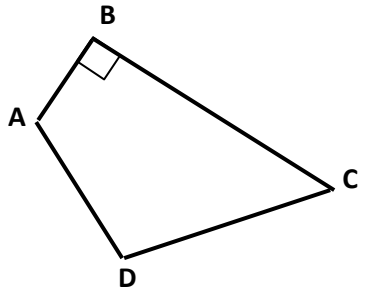
y = 52°



Topic 15: Triangles and straight lines

Exercise

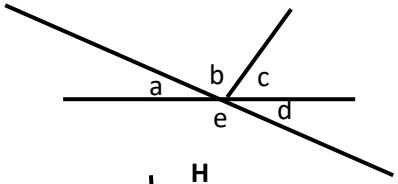
1 a. Identify the acute angles in this shape.
b. Identify the obtuse angles in this shape.
c. Are there any right angles in this shape?



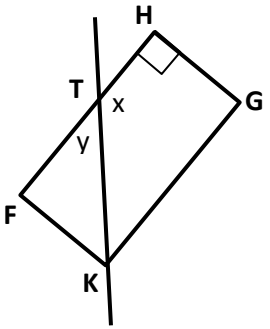
2 Are the following angles acute, obtuse or right angles?

a. 115° b. 91° c. 23° d. 90° e. 69°

3. a. In this diagram, angle e = 123° and angle c = 45°. What are the sizes of angles a, b and d?
b. a + b + c = 180°. Name three more sets of angles that are supplementary.



4. Look at the shape.
a. What kind of angle is x?
b. What kind of angle is y?
c. What is the size of angle H?
d. Identify a line that makes a straight angle.
e. Identify supplementary angles on a straight line.



Check your answers:

1a. C is acute.
b. A and D are obtuse.
c. Yes. B is a right angle.

2a. obtuse
b. obtuse
c. acute
d. right angle
e. acute

3a. a = 57 d = 57 b = 78
b. b + c + d = 180°
d + e = 180°
a + e = 180°

4a. x is an obtuse angle.
b. y is an acute angle.
c. H = 90°
d. line FTH
e. x + y = 180°, so they are supplementary.