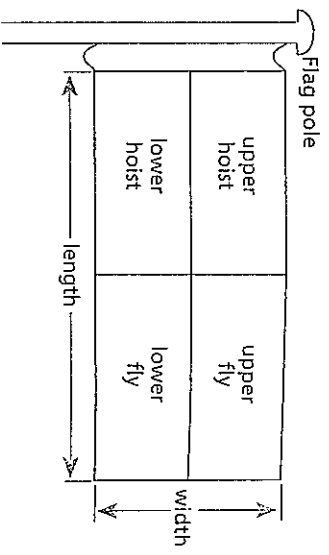


The Geometry of Flag Design

Flags are divided into quarters which are known as cantons. The two cantons nearest the flag-pole are called the hoist and the other two are called the fly.



Constructing a flag is easy when the design is given in geometrical terms. Some of the expressions used to describe a flag's construction include:

- top left-hand corner *or* upper hoist
- bottom right-hand corner *or* lower fly
- vertical, horizontal or diagonal stripes
- down the middle
- equal width
- half, or twice, the width
- across the centre



Remember!

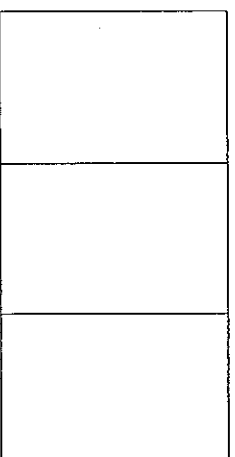
It's easy to remember the difference between horizontal and vertical.

Horizontal lines are flat, like the horizon and vertical lines are straight up and down, like vertical blinds!

Example 1

Write a geometrical description of this flag.

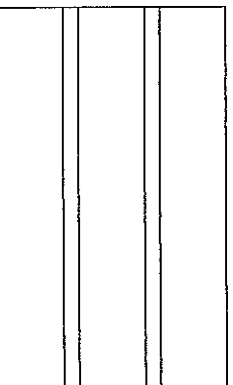
Answer
The flag has 3 vertical stripes of equal width.



Example 2

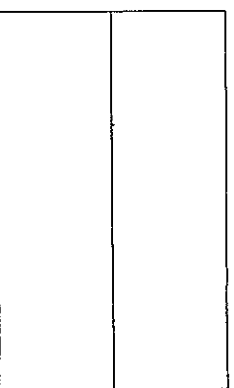
Lisa drew this diagram when she was asked to draw a flag with 2 horizontal stripes of equal width.

Explain why Lisa's diagram is wrong.



Answer

Lisa's diagram is wrong because it has 5 horizontal stripes. Her diagram should look like this.



Worksheet 7:8

1 Which description matches which flag?

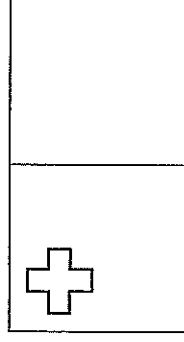
(i) Two vertical stripes of equal width with a Crescent in the upper fly.

(ii) Two horizontal stripes of equal width with a Crescent in the upper hoist.

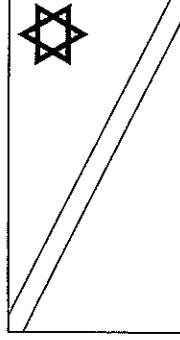
(iii) A Greek Cross in the upper hoist and two vertical stripes of equal width.

(iv) A diagonal stripe from the upper hoist to the lower fly with a Star of David in the upper fly.

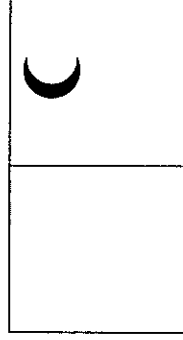
(v) Two vertical stripes where the stripe in the hoist has half the width of the other stripe.



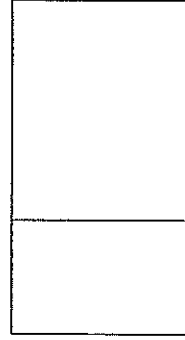
(a)



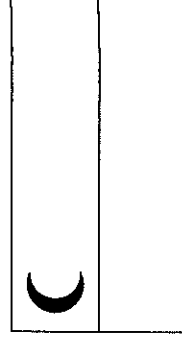
(b)



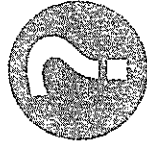
(c)



(d)



(e)

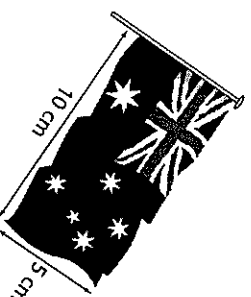
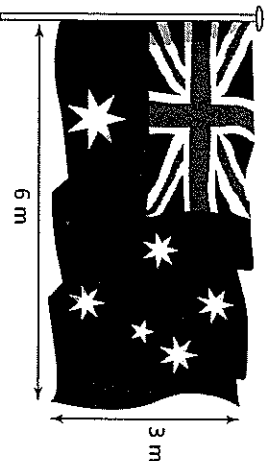
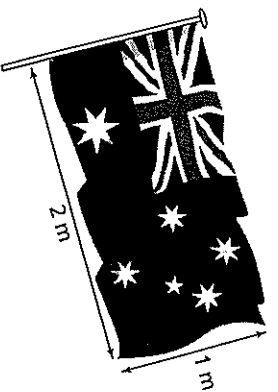
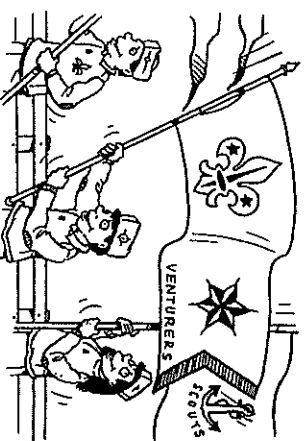


Did you know?

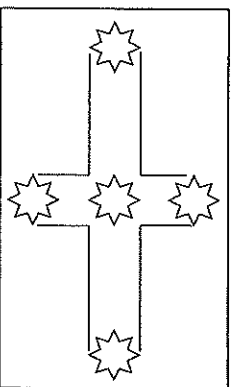
The Australian Aboriginal flag was designed by Mr Harold Thomas, an elder of the Aranda people in Central Australia. The flag symbolises the unity of the Aboriginal people with the land.

Ratio and Proportion in Flag Design

Flags are made in different sizes, from small flags on sticks to giant flags on flag-poles. Even though the size can be different, the proportions of the flag are always the same. When Australian flags are manufactured the length of the flag is always twice the size of the width. The ratio of the length to the width of an Australian flag is always 2:1.

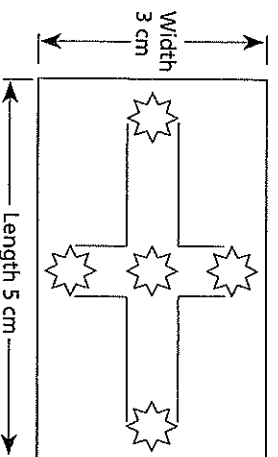


Example 1



Use the scale drawing of the Eureka Stockade flag to find the ratio of its length to its width.

Answer



The length in the scale drawing is 5 cm and the width is 3 cm.
The ratio of the length to the width is 5:3.

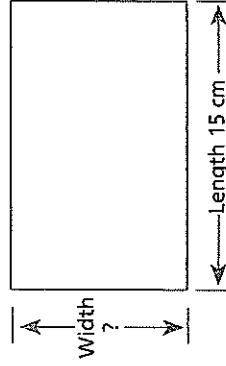
Did you know?

A person who studies flags is called a vexillologist.



Example 2

Matt is going to make a Eureka Stockade flag as part of his history assignment. The dimensions of the Eureka Stockade flag are in the ratio of 5:3. He wants to make the flag 15 cm long. How wide will the flag be?

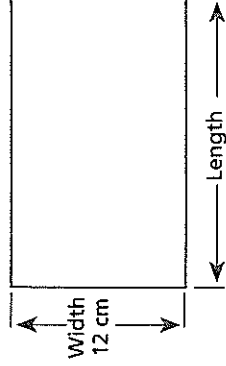
Answer

Matt knew the width was smaller than the length. He changed the ratio of the flag's dimensions to a fraction with the smaller number on top.

$$\begin{aligned} \text{Width of flag} &= \text{length of the flag} \times \text{the ratio of dimensions} \\ &\quad \text{as a fraction} \\ &= 15 \text{ cm} \times \frac{3}{5} \\ &= 9 \text{ cm} \end{aligned}$$

Example 3

Cindy wanted to make her Eureka Stockade flag 12 cm wide. How long will her flag be?

Answer

Cindy knew the length would be larger than the width. She wrote the ratio of the dimensions with the larger number on top.

$$\begin{aligned} \text{Length of the flag} &= \text{width of the flag} \times \text{ratio of dimensions as a fraction} \\ &= 12 \text{ cm} \times \frac{5}{3} \\ &= 20 \text{ cm} \end{aligned}$$

**Hint:**

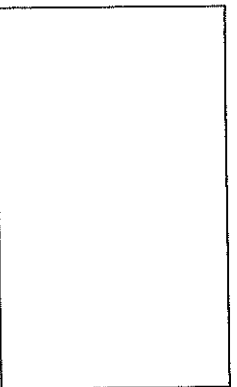
When a diagram has been 'drawn to scale' it is usually necessary to use a ruler to measure the diagram to solve the problem.

The **only** time measurement can be used to solve problems is when the diagram has been drawn to scale.

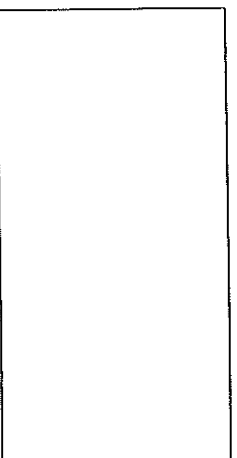
Worksheet 7:9

1 Measure these flags and write down the ratio of their length to their height.
(Simplify the ratio if you can.)

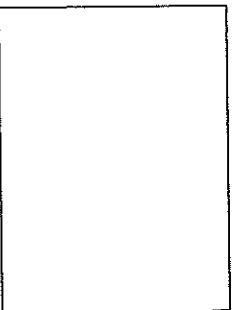
(i)



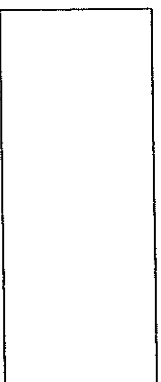
(ii)



(iii)



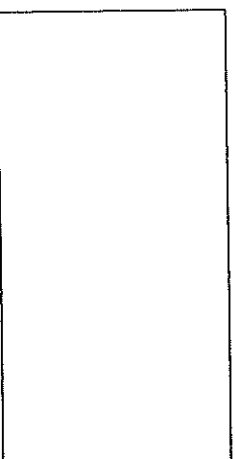
(iv)



2 The ratio of the length to the height on the Yugoslavian flag is 2:1.

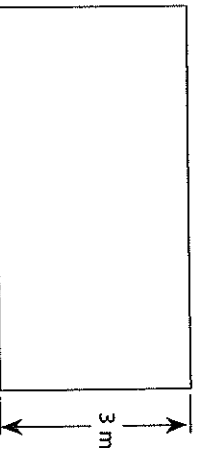
(i) Follow these instructions to complete a picture of the flag.

'It has 3 horizontal strips of equal width. The bottom strip is red, the middle white and the top blue. In the centre there is a large 5-pointed red star.'

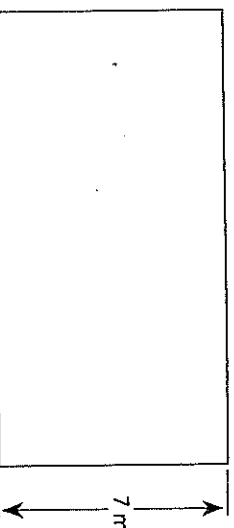


(ii) These scale diagrams represent different-sized Yugoslavian flags. Calculate the missing dimension on each flag.

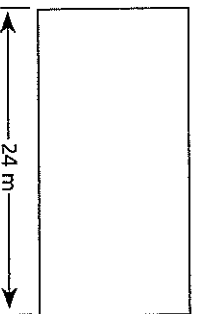
(a)



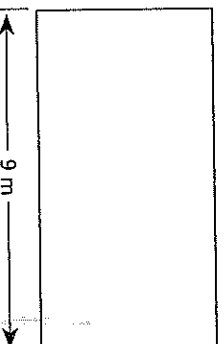
(b)



(c)

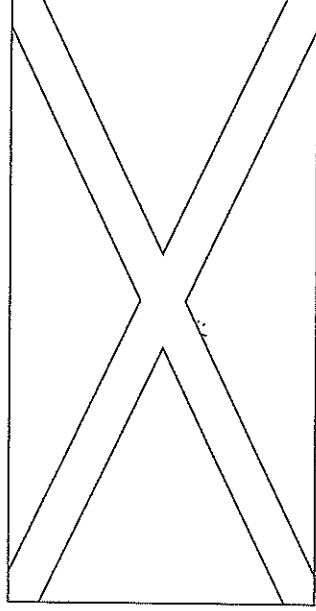


(d)



3 The flag of Scotland has a white cross on a blue background.

(i) Copy and colour the flag.

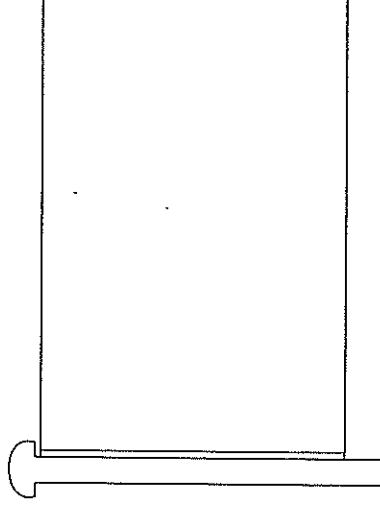


(ii) The flag has been drawn to scale.

Use a ruler to measure its dimensions and find the ratio of its length to height.

(iii) A Scottish flag has a height of 1.5 metres. What is its length?

4 (i) Copy this scale drawing of the Australian Aboriginal flag and follow these directions to complete it.



'The flag has a large yellow circle in the centre. It also has two horizontal stripes of equal width. The top stripe is black and the bottom stripe is red.'

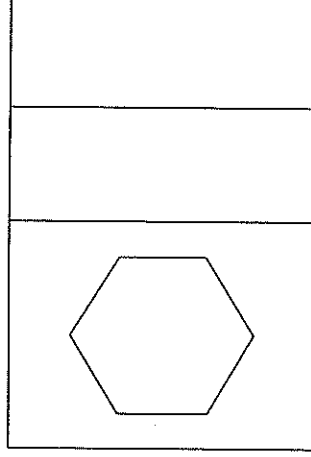
(ii) What do the colours on the flag represent?

(iii) An Aboriginal flag has a length of 6 metres. What is its height?

5 Here is the scale drawing Phoebe drew of a new company flag.

(i) Describe the flag.

(ii) The height of the flag is 1.5 metres. What is the length of the flag?

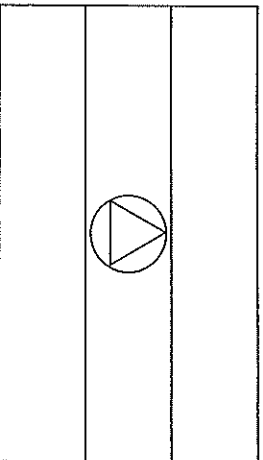


Worksheet 7:10 Miscellaneous Problems

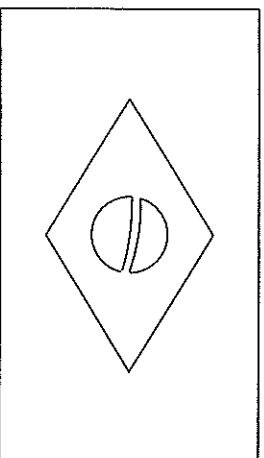
1 What geometrical shapes can you see in these flags?

(Hint: circles, squares, rectangles, equilateral or isosceles triangles, trapeziums, pentagons,)

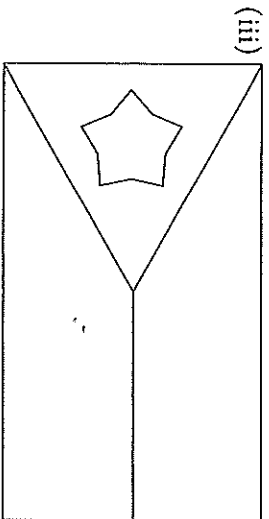
The flag of Nicaragua



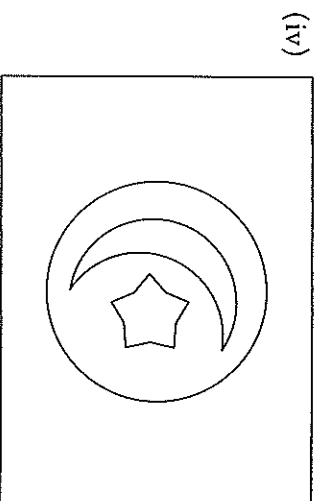
The flag of Brazil



The flag of Djibouti

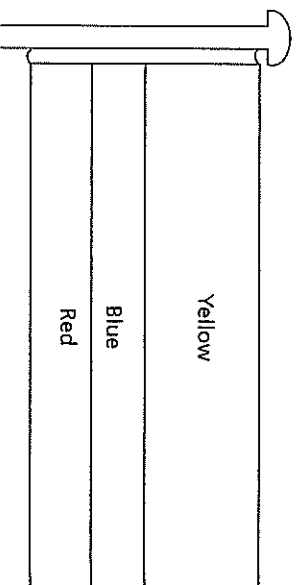


The flag of Tunisia



2 This is a scale drawing of the flag of Ecuador.

- (i) Use your ruler to measure the flag and find the ratio of its length to width.
- (ii) The flag has a length of 3.5 metres. What is its height?
- (iii) Your friend wants to know how to draw and colour the flag. Write how you would explain it over the phone.



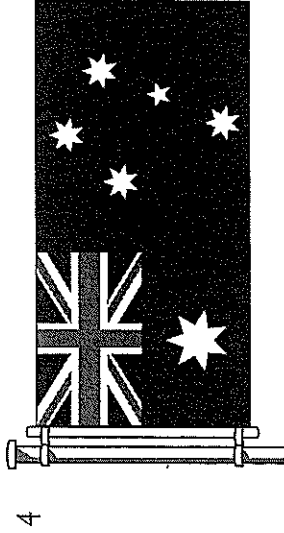
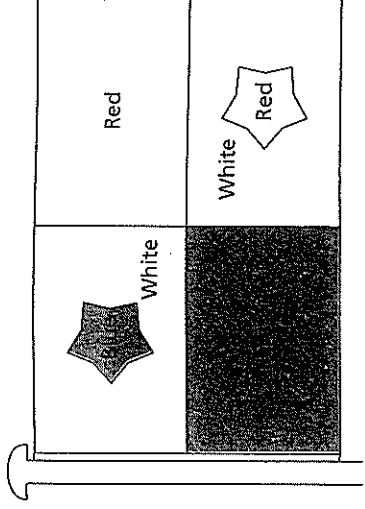
Did you know?

The first Union Jack only included the white cross of St Andrew of Scotland and the red cross of St George of England. In 1801 the red cross of St Patrick of Ireland was included to form the modern flag of the United Kingdom.



3 Here is a scale drawing of the flag of Panama.

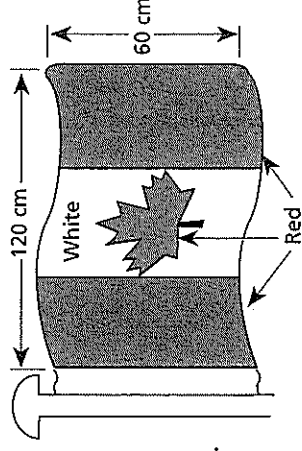
- (i) Describe the design of the flag.
- (ii) What is the ratio of the length to the width of the flag?
- (iii) The real flag is 70 cm wide. How long is it?



Dick Smith flies a giant Australian flag which is 6 m long and 3 m high.

- (i) What is the ratio of its height to length?
- (ii) What is the area of Dick Smith's flag?
- (iii) 15% of the Australian flag is white. Calculate the area of white on Dick Smith's Australian flag.

- 4
- 5 This is a diagram of the Canadian flag.
- (i) What is the ratio of the length to the width?
 - (ii) The red stripes are both 30 cm wide. What shape is the middle white section?
 - (iii) The area of the maple leaf is approximately 1600 cm². What percentage of the Canadian flag is red?



- 6
-

This is a scale drawing of the NATO shipping signal for 'P'.

What fraction of the area of the flag is white?