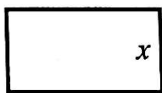## More about equations

### Example: 1

The length of a rectangle is twice its width and its perimeter is **24** $cm$.

(i)   Calculate the actual width and length.

(ii)  Find the area of the rectangle.



$$x + 2x + x + 2x = 24$$
$$6x = 24$$
$$\frac{6}{6}x = \frac{24}{6}$$
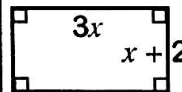$$x = 4 \; cm$$

The width of a rectangle = **4** $cm$

The length of a rectangle
$$= (2 \times 4) = 8 \; cm$$

The area of rectangle = L × w
$$= (8 \times 4) cm^2$$
$$= 32 \; cm^2$$

### Example: 2

The three sides of a rectangle in order are  $3x$,  $x + 2$ and $2x + 6$

(i)   Find the value of $x$.

(ii)  Find the width and length of a rectangle.

(ii)  Find the perimeter and area of the rectangle.



(i)
$$3x = 2x + 6$$
$$-2x = -2x$$
$$x = 6$$

(i) The width $(x + 2)$ is $6 + 2 = 8 \; cm$
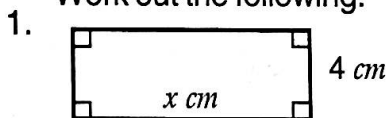
The length $(3x)$ is $(3 \times 6) = 18 cm$

(ii) The perimeter = 18+8+18+8
$$= 26+26 = 52 \; cm$$

The area   $= l \times w$
$$= 18 \times 8$$
$$= 144 \; cm^2$$

## Exercise 14:38

Work out the following.

1.    4 $cm$

   Find the value of $x$ if the perimeter of the rectangle is 24 $cm$.

2. The length of the rectangle is **2** $cm$ more than its width. Find the:
   (i)  actual length and width if the perimeter is **20** $cm$ .
   (ii) area of the rectangle.

3. The length of a rectangle is twice its width. The perimeter of the rectangle is **30** $cm$.  Find the :
   (i)   actual length of the rectangle.
   (ii)  actual width of the rectangle.
   (iii) area of the rectangle.

4. The width of a rectangle is **3** $cm$ less than the length.  The perimeter of the rectangle is **22** $cm$.  Find the:
   (i)  actual length and width of the rectangle.
   (ii) area of the rectangle.

# Application of algebra in solving real life problems

## Examples 11.11

A mother is three times as old as her daughter. Write an expression for the sum of their ages after five years.

**Solution**

Let their ages be

Now: daughter = $x$

mother = $3x$

5 yrs time: daughter = $x + 5$

mother = $3x + 5$

The sum of their ages after 5 years will be

$$= (x + 5) + (3x + 5)$$
$$= x + 5 + 3x + 5$$
$$= 4x + 10 \text{ years}$$

## Examples 11.12

The breadth of a rectangle is one third of its length. If the perimeter of the rectangle is 32 cm, find its area.

**Solution**

Let length (l) = $x$, breadth (w) = $\frac{1}{3}x$

Perimeter: $2(L + \beta) = 32$

$$2(x + \frac{1}{3}x) = 32$$

Opening brackets: $2x + \frac{2}{3}x = 32$

Simplifying: $2\frac{2}{3}x = 32$

$$\frac{8}{3}x = 32$$

Multiplying by 3 both sides of the equal signals by 3: $\frac{8x}{3} \times 3 = 32 \times 3$

$$8x = 96$$
$$x = 12$$

L = $x$ = 12 cm, B = $\frac{1}{3} \times 12 = 4$ cm

Area = L × B = 12 × 4 = 48 cm$^2$

## Exercise 11.5

1. Adongo bought 2 pencils at Sh $x$ and 3 rubbers at Sh $y$. Write an expression for the total amount she paid.

2. Apio gave half of her cows to her eldest son and 20 to her eldest daughter. Write down an expression for the number of cows she was left with.

3. Walube harvested a certain number of bags of maize. He bought another 7 bags and added to his harvest. He then mixed $\frac{3}{4}$ of all his maize with pesticides. Write down an expression for the number of bags that were mixed with pesticides.

4. Kasozi had four times as many cows as Ochwa. When Kasozi sold six of his cows, he was left with two. How many cows did Ochwa have?

5. Nafula has six times as much money as Sanyu. Hussein has Sh 600 more than Nafula while Isiko has $\frac{2}{3}$ of what Hussein has. If Isiko has Sh 4 000, how much money does Sanyu have?

6. The total age of three children is 34. The middle child is three times the youngest. The oldest is four and half times the youngest. What is the age of each of the children?

7. John had 4s sweets which was twice as many as James had. Jane had four more than John while Julie had half as many as Jane.

    (a) Write an expression to show how many sweets Jane had.

    (b) If altogether they had 30 sweets, how many sweets did each have?

8. The angles of a triangle PQR are:

    $P = (y - 10)°$; $Q = (1\frac{2}{5} y + 20)°$ and $R = y°$.

    Find the value of $y$.

9. The area of triangle PQR alongside is 24 cm². The base is $3x + 2$ cm and the height is 6 cm.

    What is the length of the base QR?

    P
    6 cm
    Q — 3x + 2 — R

10. A rectangle has length of $4n + 2$ cm and breadth half as long. If the perimeter of the rectangle is 30 cm, calculate;

    (a) the value of n          (b) the breadth of the rectangle
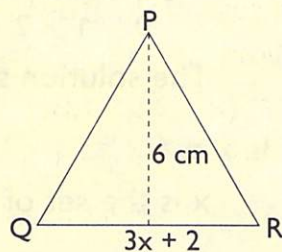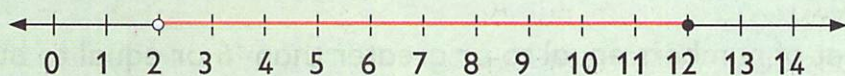
## Inequalities and solution sets

Let set A = numbers greater than 2, but less than or equal to 12.

We can write this as: $2 < A \leq 12$. Such a mathematical statement is called an inequality.

We can also use the numberline to show this set.

0  1  2  3  4  5  6  7  8  9  10  11  12  13  14

Note: ○ is used to show a number that is not included in the set.

    ● shows a number that is included in the set

The solution set for $2 < A \leq 12$ is the numbers 3, 4, 5, 6, 7, 8, 9, 10, 11 and 12.

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