Solving problems using linear equations.

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Changing the english sentances into maths

Words	Maths
A number	X or a letters : its the variable
the sum	+ plus : you add
is added to	⊕
is taken from	− minus : subtraction
times	⊗ multiply
the result	= equals The answer.

Eg1) When 3 is taken from 5 times a certain number, the result is the same as adding 6 to twice the same number. Find the number.

$5(x)$ $-$ $=$ $+$

$5x - 3 = 2x + 6$ made equation

$-2x$	$3x - 3 = 6$	$-2x$
$+3$	$3x = 9$	$+3$
$\div 3$	$x = 3$	$\div$

Eg2) When Five times a number is reduced by 3, the result is the same as adding 9 to four times a number. Find the number

$-$ $=$ $+$

$5x - 3 = 4x + 9$

$-4x$	$1x - 3 = 9$	$-4x$
$+3$	$x = 12$	$+3$

T&T2 1.5
Solving...

Algebra 1

chapter 1

9

Section 1.5 Solving problems using linear equations

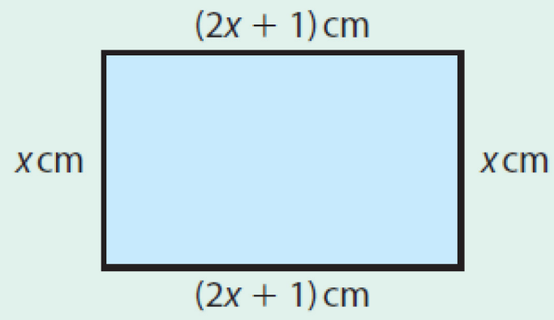
Example 1

When five times a certain number is reduced by 4, the result is the same as adding 7 to four times the number.
Find the number.

Example 2

(i) Find an expression, in terms of x, for the perimeter of this rectangle.
Give your answer in its simplest form.

(ii) The perimeter of the rectangle is 44 cm.
Write down an equation and solve it to find the value of x.



Exercise 1.5

1. If I multiply a number by 4 and then add 3, the result is the same as adding 8 to three times the number.
Form an equation in x and solve it to find the number.

$4x+3 = 3x+8$

$-3x$ | $x+3 = 8$ | $-3x$

-3 | $x = 5$ | -3

2. I think of a number, multiply it by 8 and then subtract 2.
I get the same result as when I multiply this number by 2 and add 10. What is this number?

$8x - 2 = 2x + 10$

$-2x$ | $6x - 2 = 10$ | $-2x$

$+2$ | $6x = 12$ | $+2$

$\div 6$ | $x = 2$ | $\div 6$

3. One number is 5 greater than another number.
If the smaller number is added to twice the larger number, the answer is 28.
Find the two numbers.

$(x) + 2(x+5) = 28$

Small Large

$x + 2x + 10 = 28$

$3x + 10 = 28$

-10 | $3x = 18$ | -10

$\div 3$ | $x = 6$ | $\div 3$

small $(x = 6$

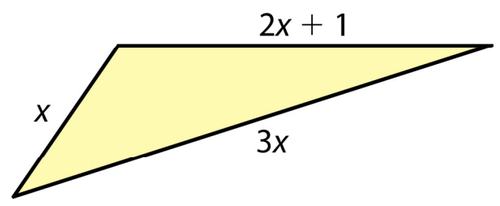
Large $(6+5 = 11.$

H/W

4. Ann is 3 years older than Helen.
If twice the sum of their ages is 50 years, how old is Ann?

5. (i) Find an expression for the perimeter of this triangle.

(ii) What value of x gives a perimeter of 55?

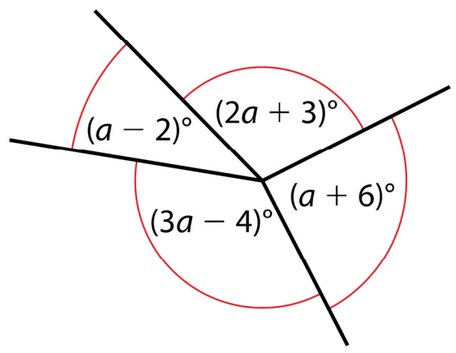


HW

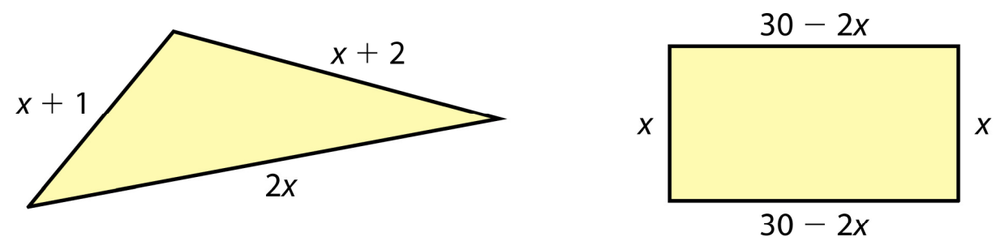
6. If we subtract 4 from a number and then multiply the result by 5, the answer is 15. Find the number.

7. I think of a number, increase it by 4 and double the answer. The result is 20 more than the number. Find this number.

8. Use your knowledge of angles to form an equation and solve it to find the value of a.



9. A triangle and rectangle are shown below:



Find the value of x which

(i) gives a triangle with a perimeter of 63

(ii) gives a triangle and rectangle with equal perimeters

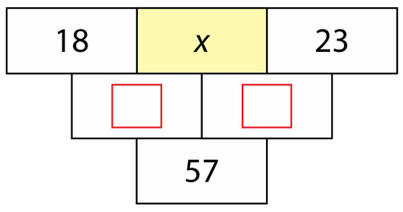
(iii) makes the rectangle into a square.

10. Here is a fraction: $\frac{x}{\square}$.

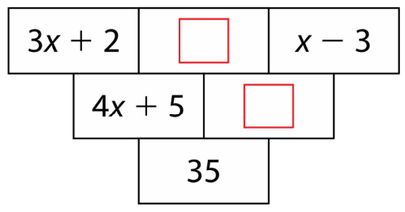
The denominator of the fraction is 5 more than the numerator.
If 1 is added to the numerator and 2 is subtracted from the denominator, the fraction will become $\frac{4}{5}$. Find the fraction.

11. The number in each brick is found by adding the two numbers above it.
Find the missing expressions in each of the diagrams below.
Write equations to find the value of x in each case.

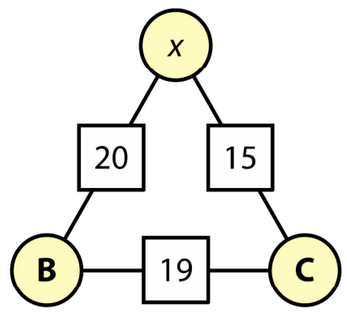
(i)



(ii)



12. In an arithmagon, the number in a square is the sum of the numbers in the two circles either side of it.



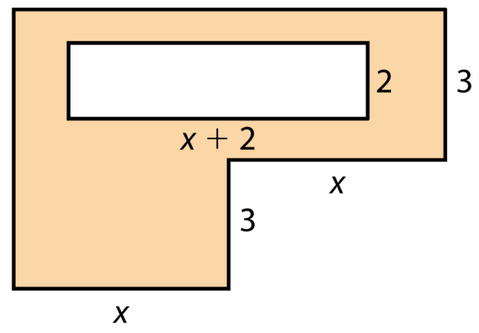
(i) Explain why the number in circle **B** is $20 - x$.

(ii) What is the number in circle **C** in terms of x?

(iii) Form an equation across the base of the triangle and solve it to find the value of x.

13. Find an expression in x for the area of the shaded portion of this figure.

If the area of this shaded portion is 38 cm^2, find the value of x.



14. Ruth is x years old. Write, in terms of x,

(i) her age 6 years ago

(ii) her age in 12 years time.

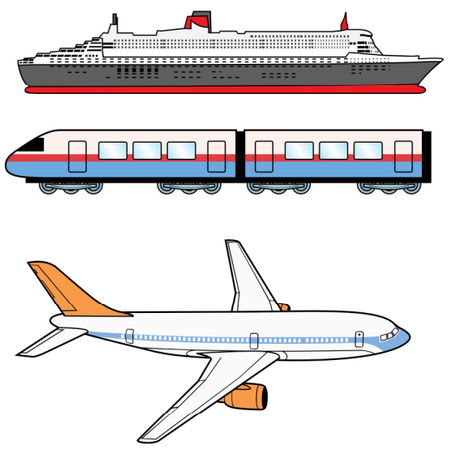
In 12 years time, Ruth will be three times as old as she was 6 years ago.
Find Ruth's age now.

15. 166 people live in an apartment block and of these, x are women.
There are 8 fewer men than women and there are 30 more children than women.
How many women live in the block?

16. In a race between two cities, one person travels by air, another by sea and the third by train.

The sea voyage takes 120 minutes longer than the train journey, and the air route takes 80 minutes less than the train journey.

If the total travelling time is 10 hours and 40 minutes, use algebra to find the time taken by each of the race participants.



Answers

Exercise 1.5

1. 5 **2.** 2

3. 6 and 11 **4.** 14 yrs old

5. (i) $6x + 1$ (ii) 9

6. 7 **7.** 12 **8.** 51

9. (i) 15 (ii) $9\frac{1}{2}$ (iii) 10

10. $\frac{7}{12}$

11. (i) 8 (ii) 5

12. (i) *As* $20 - x + x = 20$

(ii) $15 - x$ (iii) 8

13. $(7x - 4)\,cm^2$; 6

14. (i) $(x - 6)$ yrs (ii) $(x = 12)$ yrs

(iii) 15 yrs

15. 48

16. Air – 2 hours, Sea – 5 hours 20 min,
Train – 3 hours 20 min