Forming and Solving Linear Equations

Q1.

The diagram shows a trapezium.

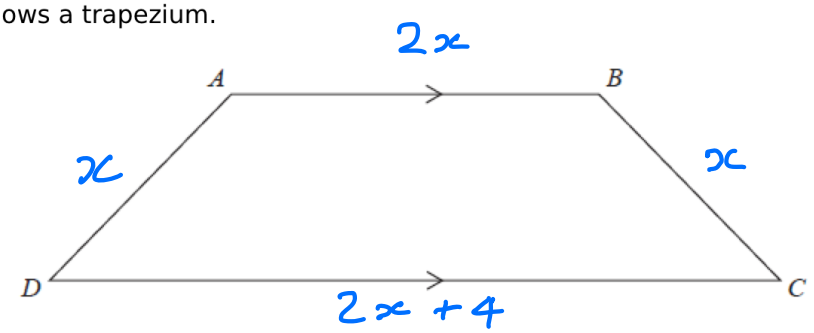


Diagram **NOT** accurately drawn

AD = *x* cm.
BC is the same length as *AD*.
AB is twice the length of *AD*.
DC is 4 cm longer than *AB*.

The perimeter of the trapezium is 38 cm.

Work out the length of *AD*.

$2x + x + x + 2x + 4 = 38$

$6x + 4 = 38$

$6x = 38 - 4$

$6x = 34$

$x = \frac{34}{6} = 5\frac{2}{3}$ cm

(Total for Question is 4 marks)

Q3.

ABC is a triangle.

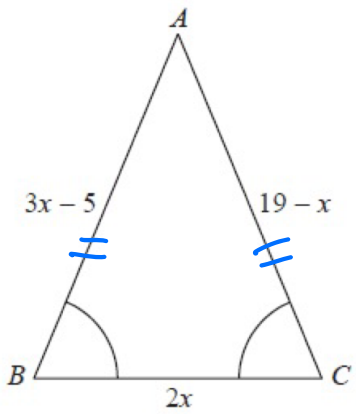


Diagram **NOT** accurately drawn

Angle *ABC* = angle *BCA*.

The length of side *AB* is (3*x* − 5) cm.

The length of side *AC* is (19 − *x*) cm.

The length of side *BC* is 2*x* cm.

Work out the perimeter of the triangle.

Give your answer as a number of centimetres.

Isosceles △ so

$3x - 5 = 19 - x$

$3x + x = 19 + 5$

$4x = 24$

$x = \frac{24}{4}$

$x = 6$

Perimeter $= 3x - 5 + 19 - x + 2x$

$= 4x + 14$

$= 4(6) + 14$

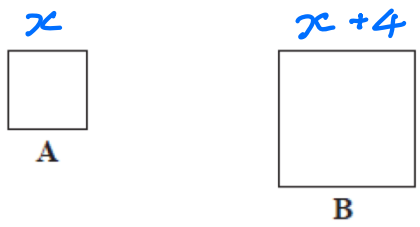
38 cm

(Total for Question is 5 marks)

Q8.

$(a+b)^2$
$= a^2 + b^2 + 2ab$

Here are two squares, **A** and **B**.



The length of each side of square **B** is 4 cm greater than the length of each side of square **A**.
The area of square **B** is 70 cm^2 greater than the area of square **A**.

Find the area of square **B**.
Give your answer correct to 3 significant figures.
You must show all your working.

$(x+4)^2 = x^2 + 70$

$(x+4)(x+4) = x^2 + 70$

$\cancel{x^2} + 8x + 16 = \cancel{x^2} + 70$

$8x = 70 - 16$

$8x = 54$

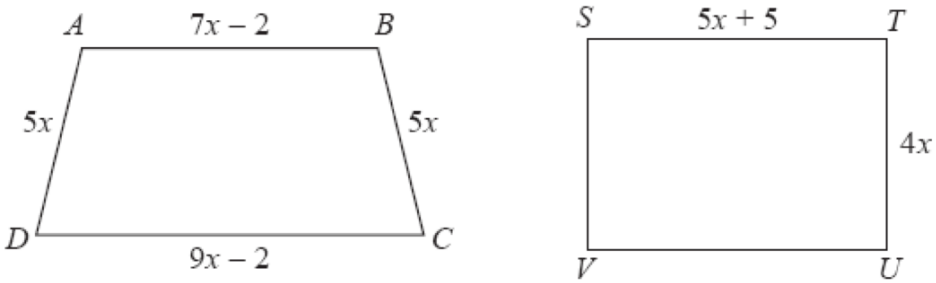
$x = \frac{54}{8} = 6.75$

Area of B $= (6.75+4)^2$
$= 10.75^2$
$= 115.5625 = 116 \text{ cm}^2$ to 3 s.f.

..... cm^2

(Total for question = 4 marks)

Diagram **NOT** accurately drawn



All measurements are in centimetres.

The two shapes have the same perimeter.

Work out the length of *ST*.

$7x - 2 + 5x + 5x + 9x - 2 = 2(5x+5) + 2(4x)$

$26x - 4 = 10x + 10 + 8x$

$26x - 4 = 18x + 10$

$26x - 18x = 10 + 4$

..... cm

$8x = 14$

$x = \frac{14}{8}$

(Total for question = 5 marks)

$x = 1.75$

$ST = 5(1.75) + 5$

$ST = 13.75$ cm

Q2.

Gemma has the same number of sweets as Betty.

Gemma gives 24 of her sweets to Betty.
Betty now has 5 times as many sweets as Gemma.

Work out the total number of sweets that Gemma and Betty have.

Start	Gemma	Betty
	x	x
After	$x-24$	$x+24$

$x+24 = 5(x-24)$
$x+24 = 5x-120$
$24+120 = 5x-x$
$144 = 4x$
$\frac{144}{4} = x$
$36 = x$

Total sweets $= 2x$

$= 72$ sweets

(Total for question = 4 marks)

Q4.

Stephanie is x years old. x
Tobi is twice as old as Stephanie. $2x$
Ulrika is 3 years younger than Tobi. $2x-3$

The sum of all their ages is 52 years.

(a) Show that $5x - 3 = 52$

$x + 2x + 2x - 3 = 52$
$5x - 3 = 52$
$5x = 52 + 3$
$5x = 55$
$x = \frac{55}{5}$

(3)

(b) Work out the value of x.

$x =$ 11

(2)

Q5.

*Redlands School sent x students to a revision day. x
St Samuel's School sent twice as many students as Redlands School. $2x$
Francis Long School sent 7 fewer students than Redlands School. $x-7$

Each student paid £15 for the revision day.
The students paid a total of £1155

Number of students $= x+2x+x-7$
$= 4x-7$

Work out how many students were sent by each school to the revision day.
You must show all your working.

$15(4x-7) = 1155$
$4x-7 = \frac{1155}{15}$
$4x-7 = 77$
$4x = 77+7$
$4x = 84$
$x = 84/4$ $x = 21$

(Total for question = 5 marks)

Redlands 21
St Sam 42
Francis Long 14

Q6.

Asha and Lucy are selling pencils in a school shop.
They sell boxes of pencils and single pencils.

Asha sells 7 boxes of pencils and 22 single pencils.
Lucy sells 5 boxes of pencils and 2 single pencils.
Asha sells twice as many pencils as Lucy.

Work out how many pencils there are in a box.

Let x be in a box

Asha $7x + 22$

Lucy $5x + 2$

$7x + 22 = 2(5x+2)$

$7x + 22 = 10x + 4$

$22 - 4 = 10x - 7x$

$18 = 3x$

$\frac{18}{3} = x$

$6 = x$

6 pencils in a box

(Total for question = 4 marks)