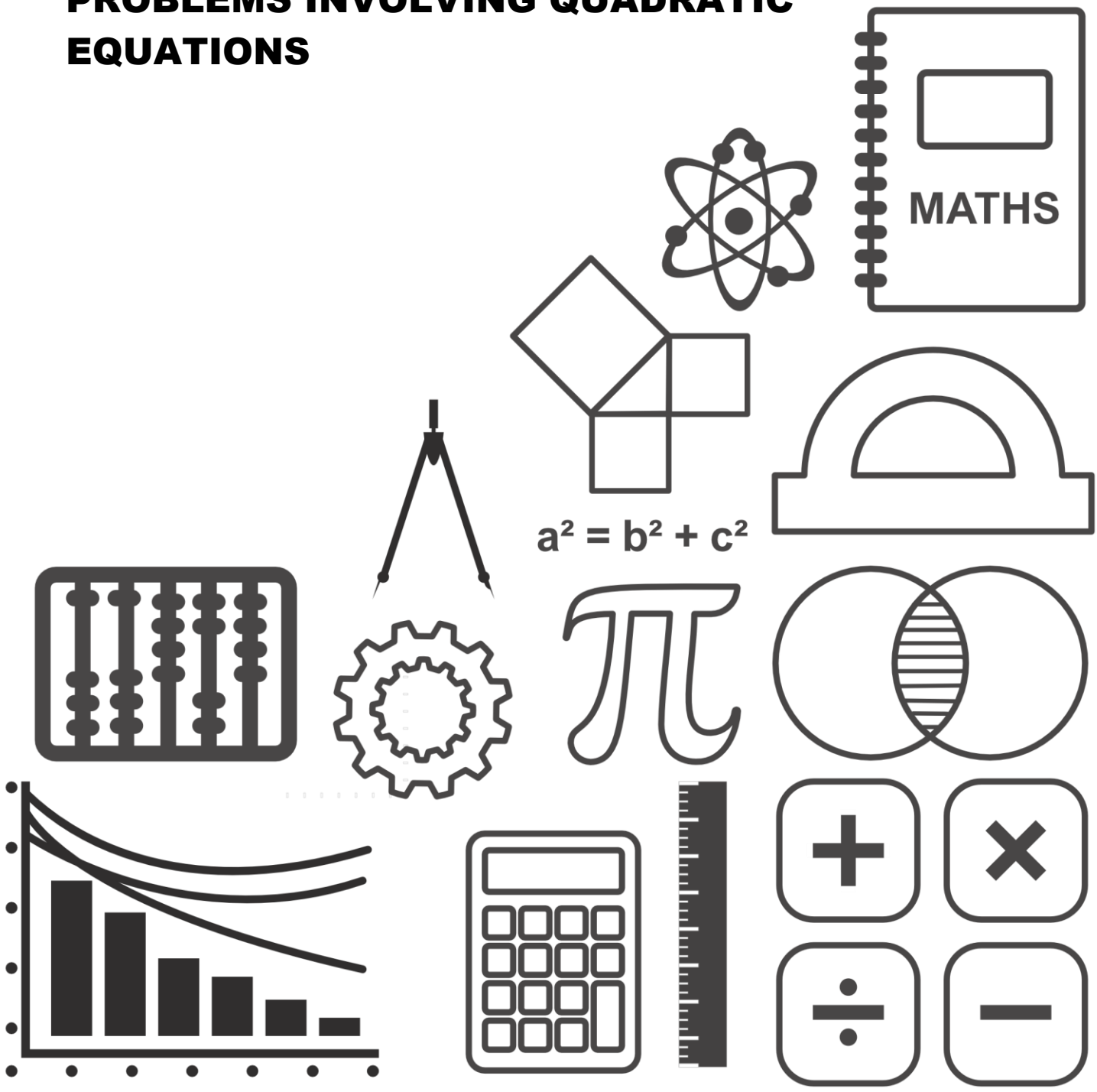
GCSE TOPIC BOOKLET
PROBLEMS INVOLVING QUADRATIC EQUATIONS



1.

The base of an open rectangular box is of length $(2x + 6)$ cm and width x cm.
The area of this base is $59\,\text{cm}^2$.
The height of the open box is $(x - 3)$ cm.

(a) Show that $2x^2 + 6x - 59 = 0$. [2]

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(b) (i) Solve the equation $2x^2 + 6x - 59 = 0$, giving your answers correct to 2 decimal places.
You must show all your working. [3]

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(ii) Hence calculate the volume of the box.
State clearly the units of your answer. [3]

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Volume of the box is .....

2. A rectangle of length $(x + 8)$ cm and width x cm has an area of y cm^2.
It is known that $y - x = 1284$.
Find the dimensions of the rectangle.
Give your answer correct to 1 decimal place.
You must use an algebraic method.

[8]

3.

The diagram shows a parallelogram and a rectangle joined along a common side.

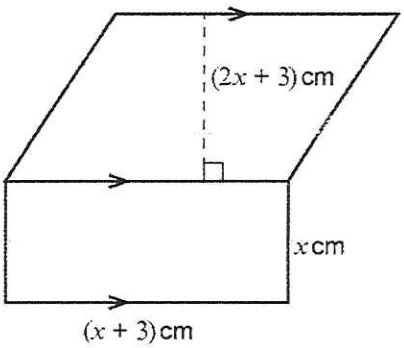


Diagram not drawn to scale

The width of the rectangle is x cm.
The length of the rectangle is $(x + 3)$ cm.
The height of the parallelogram is $(2x + 3)$ cm.
The total area of the parallelogram and the rectangle together is 70 cm^2.

(a) Show that $3x^2 + 12x - 61 = 0$. [3]

(b) Use the quadratic formula to calculate the length of the rectangle.
Give your answer correct to 2 decimal places. [4]

4. A right-angled triangle is shown below.

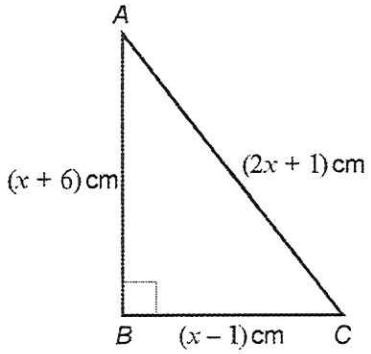


Diagram not drawn to scale

(a) Show that $x^2 - 3x - 18 = 0$. [4]

(b) Factorise the expression $x^2 - 3x - 18$, and hence solve the equation $x^2 - 3x - 18 = 0$.
Write down the lengths of the sides of the right-angled triangle. [4]

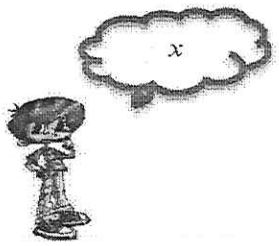
AB = ... cm *AC* = ... cm *BC* = ... cm

5. Aled has three concrete slabs.
Two of the slabs are square, with each side of length x metres.
The third slab is rectangular and measures 1 metre by $(x + 1)$ metres.
The three concrete slabs cover an area of $7\,m^2$.

(a) Show that $2x^2 + x - 6 = 0$. [1]

(b) Solve the equation to find the length of each side of the square slabs.
You must justify any decisions that you make. [4]

6. Wilf thinks of a number, x.



His sister says that if Wilf subtracts 6 from his number and multiplies this new number by the number he first thought of, he will get an answer of –5.

Use this information to

- find a quadratic equation in the form $x^2 + ax + b = 0$, and
- hence solve the equation to find the possible values of x. [6]

7.

The triangle below has an area of $10\,cm^2$.
Calculate the value of x. [7]

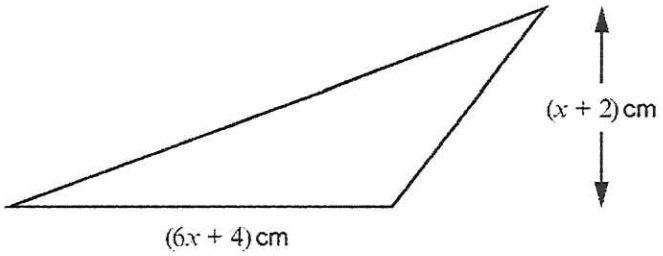


Diagram not drawn to scale

8. The diagram shows a trapezium.

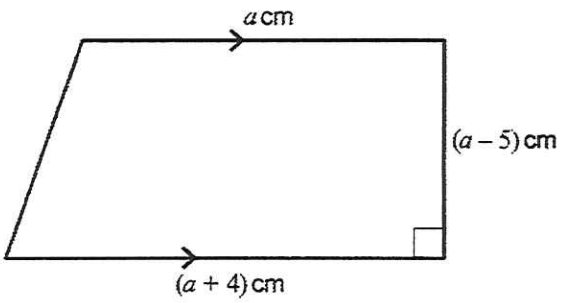


Diagram not drawn to scale

(a) Show that the area of the trapezium is $(a^2 - 3a - 10)$ cm^2.
You must show all your working. [4]

(b) The area of the trapezium is 30 cm^2.
Use an algebraic method to calculate the height of the trapezium. [5]

9.

(a) In the triangle below, show that x satisfies the equation $3x^2 - 6x - 2 = 0$. [3]

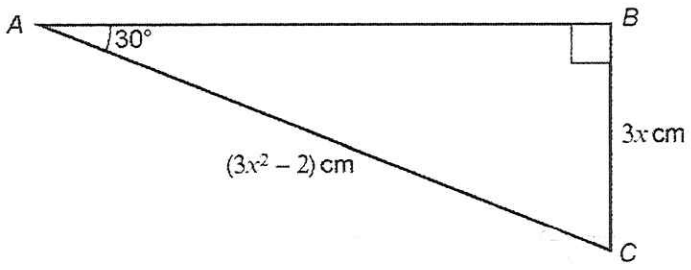


Diagram not drawn to scale

(b) Solve the equation $3x^2 - 6x - 2 = 0$ and hence find the length of BC, correct to 1 decimal place. [4]