



Aberdare Community School
Mathematics Department

WJEC GCSE

Higher – Calculator

Algebra

Quadratic formula

Name:

Set:

Date:

Teacher:

16. Use the formula method to solve the equation $3x^2 + 31x + 8 = 0$, giving solutions correct to two decimal places.

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17. The diagram shows a trapezium.

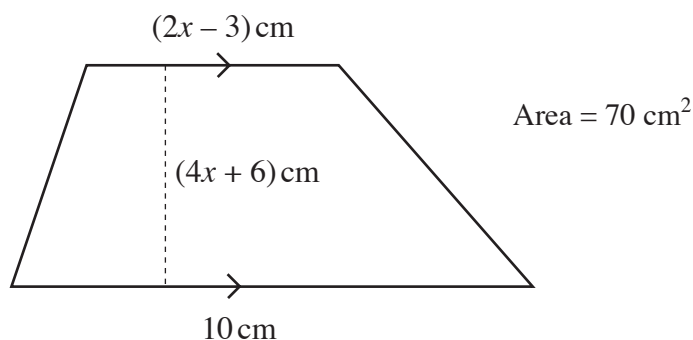


Diagram not drawn to scale.

The parallel sides of a trapezium are of lengths 10 cm and $(2x - 3) \text{ cm}$. The height of the trapezium is $(4x + 6) \text{ cm}$ and its area is 70 cm^2 .

(a) Show that $4x^2 + 20x - 49 = 0$.

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(b) Use the quadratic formula to solve the equation $4x^2 + 20x - 49 = 0$. Give your answers correct to one decimal place.

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(c) Hence write down the height of the trapezium.

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- (b) Use the formula method to solve the equation $3x^2 + 6x - 11 = 0$, giving solutions correct to two decimal places.

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17. Triangle PQR is shown in the following diagram.

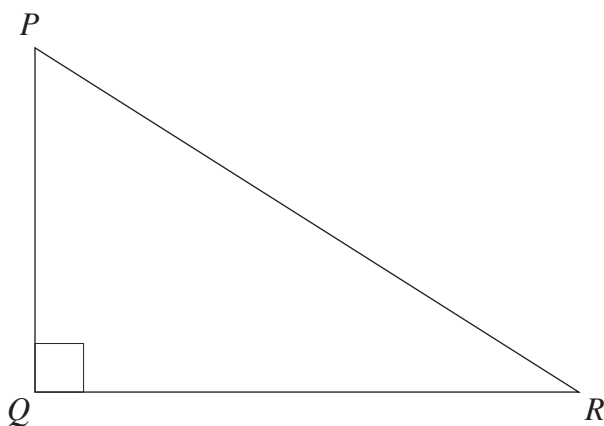


Diagram not drawn to scale.

Triangle PQR is right-angled at Q . The length of $PR = 12.3$ cm.
The length of PQ is x cm and the length of QR is 2.1 cm longer than PQ .

(a) Show that x satisfies the equation $2x^2 + 4.2x - 146.88 = 0$.

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(b) Solve the equation $2x^2 + 4.2x - 146.88 = 0$ and find the lengths of PQ and QR , giving your answers correct to 1 decimal place.

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19. The diagram shows a hexagonal prism.

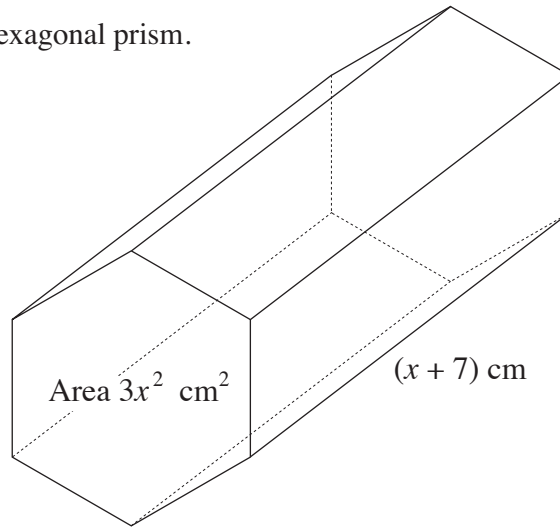


Diagram not drawn to scale.

The area of the cross-section of the prism is $3x^2 \text{ cm}^2$ and the length of the prism is $(x + 7) \text{ cm}$. The volume of the prism is $(3x^3 + 2x + 1) \text{ cm}^3$.

(a) Show that $21x^2 - 2x - 1 = 0$.

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(b) Use the quadratic formula to solve $21x^2 - 2x - 1 = 0$, giving solutions correct to two decimal places.

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(c) Hence evaluate the volume of the prism, giving your answer correct to one decimal place.

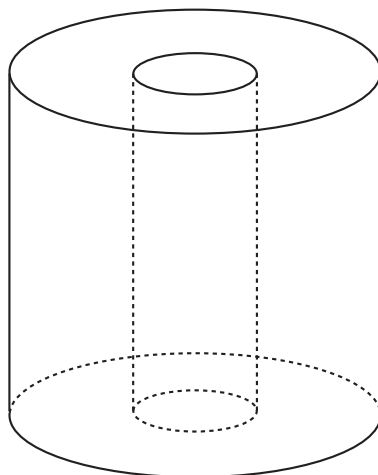
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18. A length of plastic tube has a uniform circular cross-section.
The radius of the circular hole in the centre is x cm.
The thickness of the plastic is 3 cm and the length of the plastic tube is $5x$ cm.



- (a) Show that the volume of the plastic used to make the tube is $(30\pi x^2 + 45\pi x)\text{cm}^3$.

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- (b) Given that the volume of the plastic used to make the tube is $88\pi\text{cm}^3$, find the length of the tube correct to one decimal place.

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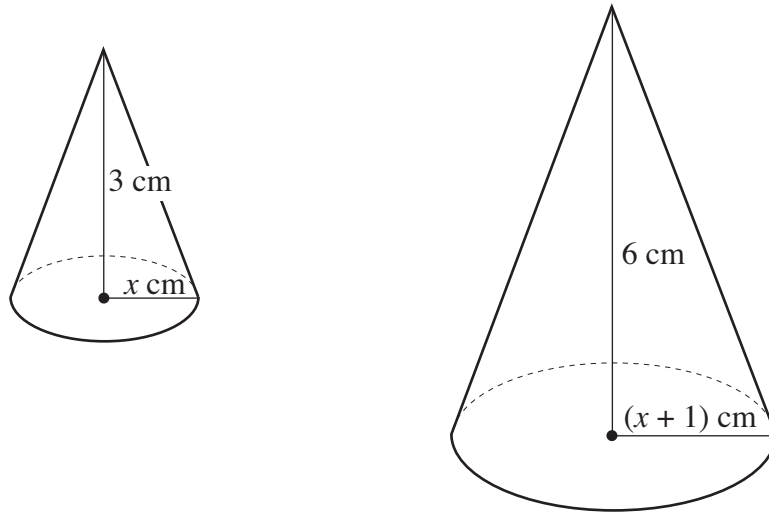
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16. Two cones are shown in the diagram below. The radius of the smaller cone is x cm and the height is 3 cm. The radius of the larger cone is $(x + 1)$ cm and the height is 6 cm.



Diagrams not drawn to scale.

- (a) The total volume of the two cones together is 102π . Show that $3x^2 + 4x - 100 = 0$.

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- (b) Calculate the radius of the larger cone to an appropriate degree of accuracy.

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15. Use the formula method to solve the equation $3x^2 + 19x + 11 = 0$, giving solutions correct to two decimal places.

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13. Use the formula method to solve the equation $3x^2 + 8x + 1 = 0$, giving solutions correct to two decimal places.

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16. Triangle PQR is shown in the following diagram.

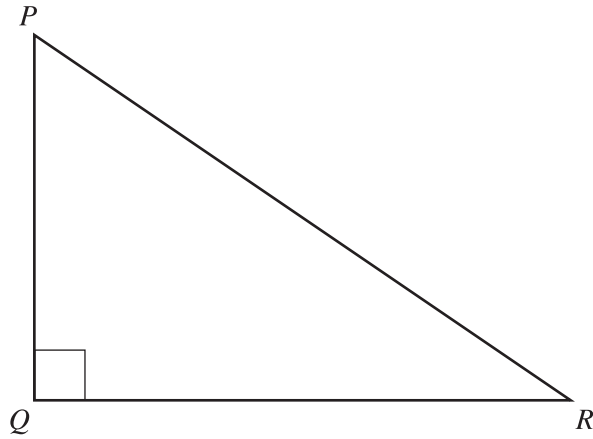


Diagram not drawn to scale.

Triangle PQR is right-angled at Q . The length of $PR = 23.6$ cm.
The length of PQ is x cm and the length of QR is 6.2 cm longer than PQ .

Write down and solve a quadratic equation to find the length of PQ correct to 1 decimal place.

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14.

- (b) Use the quadratic formula to solve the equation $4x^2 + 20x - 49 = 0$.
Give your answers correct to one decimal place.

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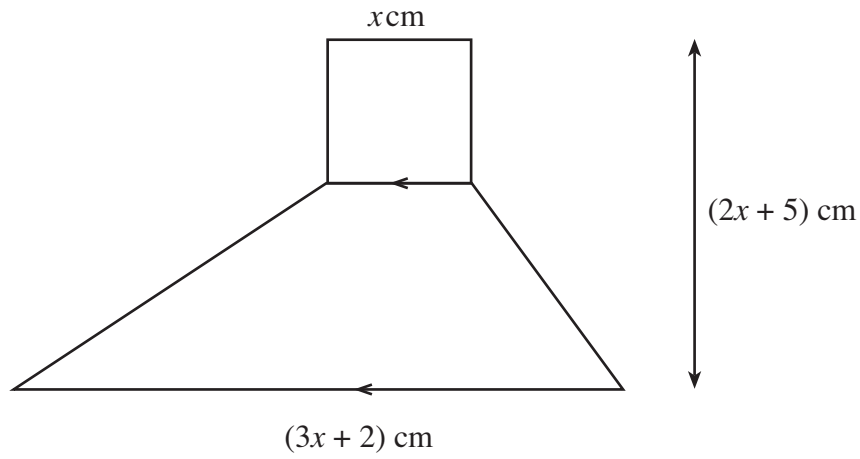
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15. A composite shape is made by joining a square and a trapezium as shown. The dimensions are shown on the diagram.



- (a) Show that the area of the trapezium is $(2x^2 + 11x + 5) \text{ cm}^2$.

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- (b) The total area of the composite shape is 15 cm^2 .
Find x correct to two decimal places.

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16. A rectangle has a length of $(5x + 6)$ cm, a width of $(3x + 2)$ cm and an area of 56 cm^2 .

(a) Show that $15x^2 + 28x - 44 = 0$.

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(b) Use the formula method to solve the equation $15x^2 + 28x - 44 = 0$, giving solutions correct to two decimal places.

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(c) Hence write down the length of the rectangle.

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- (c) Use the formula method to solve the equation $2x^2 + 16x + 23 = 0$, giving solutions correct to two decimal places.

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- (b) Use the quadratic formula to solve the equation $5x^2 + 20x - 4 = 0$.
Give your answers correct to two decimal places.

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- (e) Use the quadratic formula to solve $7x^2 - 4x - 17 = 0$ giving your answers correct to one decimal place.

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13. A solid cuboid has length $(x + 5)$ cm, width $(x + 4)$ cm and height 6 cm.
The surface area of the cuboid is 205 cm^2 .

(a) Show that x satisfies the equation $2x^2 + 42x - 57 = 0$.

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(b) Use the formula method to solve the equation $2x^2 + 42x - 57 = 0$, giving solutions correct to two decimal places.

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(c) Hence write down the dimensions of the cuboid.

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(d) Solve $3x^2 + 4x - 18 = 0$, giving your answers correct to two decimal places.

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- (b) Use the formula method to solve $2x^2 + 5x - 4 = 0$, giving your answer correct to 2 decimal places.

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- (c) Use the formula method to solve the equation $2x^2 + 3x - 3 = 0$, giving your solutions correct to two decimal places.

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15.

- (b) Use the quadratic formula to solve the following quadratic equation, giving your answers correct to 2 decimal places.

$$3x^2 - 5x - 7 = 0$$

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10. A large rectangular tile has width x cm, length $(x + 5)$ cm and area 2100 cm².
Use the quadratic formula to calculate the width of the tile, giving your answer correct to 1 decimal place.

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13.

(b) Solve the following quadratic equation.
Give your answers correct to two decimal places.

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$$5x^2 + 3x - 7 = 0$$

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15. (a) (i) Show that $(x + 2)^2 + 3(x + 1) - 11$ can be simplified to $x^2 + 7x - 4$. [2]

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- (ii) Solve the equation $x^2 + 7x - 4 = 0$, giving your answers correct to 2 decimal places. [3]

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

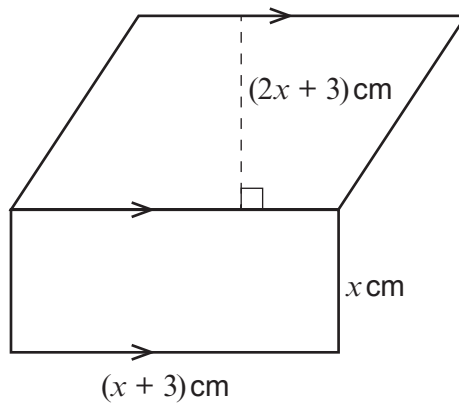


Diagram not drawn to scale

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 $3x^2 + 12x - 61 = 0$.

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

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