

THE QUADRATIC FORMULA

GRADE 5

Examination Practice Questions

You should have:

A ruler, protractor, compasses, a pen, pencil, eraser, calculator.
For some questions, you may need tracing paper.

Instructions

- Use **black** ink or ball-point pen.
- Answer the questions in the spaces provided – *there may be more space than you need.*
- **Calculators may be used.**

Information

- The marks for each question are shown in brackets.
- Use the number of marks for each question as a guide as to how much time to spend on each question. As a rough guide, you can multiply the number of marks by 1.2 to see how many minutes you should spend on a question.
- Questions been carefully compiled from or modelled on a variety of past papers and will generally get more challenging as the document progresses. Some of the later questions will go beyond the core grade level for this topic.

Advice

- Read each question carefully before you start to answer it.
- Don't forget to have fun.
- Check your answers at the end.

Q1.

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Solve

$$x^2 - 2x - 2 = 0$$

Give your answers to 1 decimal place.

$$a=1 \quad b=-2 \quad c=-2$$

$$x = \frac{2 \pm \sqrt{(-2)^2 - (4 \times 1 \times -2)}}{2 \times 1}$$

$$x = 2.7 \quad x = -0.7$$

(3 marks)

Q2.

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Use the quadratic formula to solve the equation $w^2 + 5w - 7 = 0$.

Give your answers correct to 2 decimal places.

$$a=1 \quad b=5 \quad c=-7$$

$$x = \frac{-5 \pm \sqrt{5^2 - (4 \times 1 \times -7)}}{2 \times 1}$$

$$w = -6.14 \quad w = 1.14$$

(3 marks)

Q3.

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Solve $x^2 - 10x + 18 = 0$

Give your solutions correct to 3 significant figures.

$$a=1 \quad b=-10 \quad c=18$$

$$x = \frac{+10 \pm \sqrt{(-10)^2 - (4 \times 1 \times 18)}}{2 \times 1}$$

$$x = 2.35$$

$$x = 7.35$$

(3 marks)

Q4.

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Solve the equation $4x^2 + 2x - 7 = 0$.

$$a = 4 \quad b = 2 \quad c = -7$$

Give your answers correct to two significant figures.

$$x = \frac{-2 \pm \sqrt{2^2 - (4 \times 4 \times -7)}}{2 \times 4}$$

$x = -1.6 \quad x = 1.1$

(3 marks)

Q5.

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Solve

$$5x^2 - 4x - 3 = 0$$

$$a = 5$$

$$b = -4$$

$$c = -3$$

Give your solutions correct to 3 significant figures.

$$x = \frac{+4 \pm \sqrt{(-4)^2 - (4 \times 5 \times -3)}}{2 \times 5}$$

$x = -0.472 \quad x = 1.27$

(3 marks)

Q6.

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Solve the equation $2x^2 + 5x - 4 = 0$.

$$a = 2 \quad b = 5 \quad c = -4$$

Give your answers correct to one decimal place.

$$x = \frac{-5 \pm \sqrt{(5)^2 - (4 \times 2 \times -4)}}{2 \times 2}$$

$x = -3.1 \quad x = 0.6$

(3 marks)

Q7.

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Solve $3x^2 - 5x - 1 = 0$

$a = 3 \quad b = -5 \quad c = -1$

Give your solutions correct to 2 decimal places.

$$x = \frac{+5 \pm \sqrt{(-5)^2 - (4 \times 3 \times -1)}}{2 \times 3}$$

(M1)

(A1)

$$x = -0.180 \quad x = 1.85$$

(A1)

(3 marks)

Q8.

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Solve $\sqrt{2x+3} = 3x$.

Give your answers to 4 significant figures.

SQUARE BOTH SIDES

$$2x + 3 = 3x^2$$

$$\begin{array}{r} -2x \quad -2x \\ 3 = 3x^2 - 2x \end{array}$$

$$\begin{array}{r} -3 \quad -3 \\ 0 = 3x^2 - 2x - 3 \end{array}$$

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

$a = 3 \quad b = -2 \quad c = -3$

$$x = \frac{+2 \pm \sqrt{(-2)^2 - (4 \times 3 \times -3)}}{2 \times 3}$$

(M1)

$x = 0.6991$

$x = -0.4768$

(3 marks)

Solve $x^2 = \frac{2x+7}{3}$ giving your answers correct to two decimal places.

$$3x^2 = 2x + 7 \quad (M1)$$

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

$$3x^2 - 2x - 7 = 0 \quad (M1)$$

$$a = 3 \quad b = -2 \quad c = -7$$

$$x = \frac{-2 \pm \sqrt{(-2)^2 - (4 \times 3 \times -7)}}{2 \times 3} \quad (M1)$$

$$x = -1.23 \quad (A1)$$

$$x = 1.90$$

(4 marks)

Alison is using the quadratic formula to solve a quadratic equation. She substitutes values into the formula and correctly gets

$$x = \frac{-7 \pm \sqrt{49 - 32}}{4}$$

Work out the quadratic equation that Alison is solving.

Give your answer in the form $ax^2 + bx + c = 0$, where a , b and c are integers.

$$-7 \text{ is } -b \therefore b = 7 \quad (M1)$$

$$4 \text{ is } 2 \times a \therefore a = 2 \quad (M1)$$

$$32 = 4 \times 2 \times c$$

$$\frac{32}{8} = c \therefore c = 4$$

$$2x^2 + 7x + 4 = 0 \quad (A1)$$

(3 marks)

The area of the trapezium ABCD is 25cm^2 .

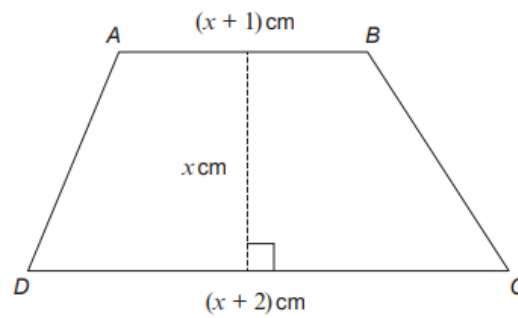


Diagram not drawn to scale

Solve the equation $2x^2 + 3x - 50 = 0$ to calculate the lengths AB and DC.
Give your answers correct to 1 decimal place.

$$a=2 \quad b=3 \quad c=-50$$

$$x = \frac{-3 \pm \sqrt{3^2 - (4 \times 2 \times -50)}}{2 \times 2}$$

$$\underline{x = 4.3} \quad \text{A}_1 \quad \cancel{x = -5.8} \quad \text{NOT POSSIBLE}$$

$$\therefore AB = 5.3 \quad \text{B}_1$$

$$DC = 6.3$$

.....
(4 marks)

The diagram shows a trapezium.

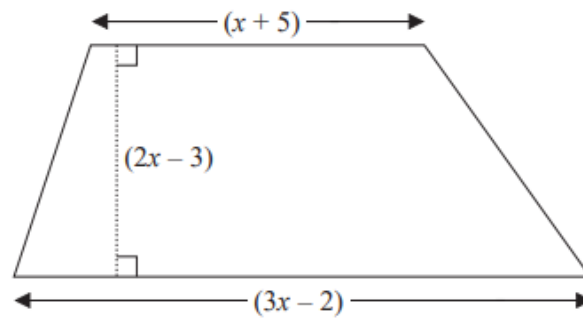


Diagram **NOT**
accurately drawn

All measurements shown on the diagram are in centimetres.

The area of the trapezium is 133 cm^2 .

Solve the equation $8x^2 - 6x - 275 = 0$ to find the value of x .

$$a = 8 \quad b = -6 \quad c = -275$$

$$x = \frac{6 \pm \sqrt{(-6)^2 - (4 \times 8 \times -275)}}{2 \times 8}$$

$$x = 6.25$$

.....
(3 marks)

The diagram shows a 6-sided shape.

All the corners are right angles.

All the measurements are given in centimetres.

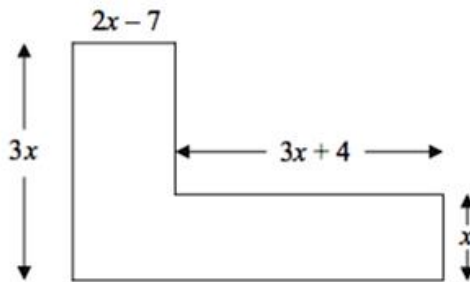


Diagram NOT
accurately drawn

The area of the shape is 85 cm^2 .

Solve $9x^2 - 17x - 85 = 0$ to find the value of x .

Give your solutions correct to 3 significant figures.

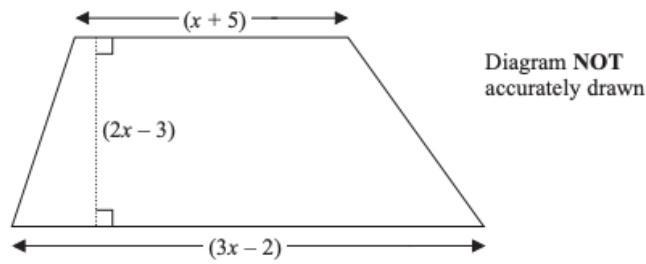
$$a = 9 \quad b = -17 \quad c = -85$$

$$x = \frac{+17 \pm \sqrt{(-17)^2 - (4 \times 9 \times -85)}}{2 \times 9}$$

$$\underline{\underline{x = 4.16}} \quad \text{A}_1 \quad \text{---} \quad \cancel{x = -2.27}$$

(3 marks)

The diagram shows a trapezium.



All measurements shown on the diagram are in centimetres.

The area of the trapezium is 133 cm^2

Solve the equation $8x^2 - 6x - 275 = 0$ to find the height of the trapezium.

$$a = 8 \quad b = -6 \quad c = -275$$

$$x = \frac{6 \pm \sqrt{(-6)^2 - (4 \times 8 \times -275)}}{2 \times 8}$$

$$x = 6.25 \quad \text{A}_1$$

$$\begin{aligned} \text{HEIGHT} &= (2 \times 6.25 - 3) \\ &= 9.5 \quad \text{A}_1 \end{aligned}$$

A cuboid has length x cm.

The width of the cuboid is 4 cm less than its length.

The height of the cuboid is half of its length.

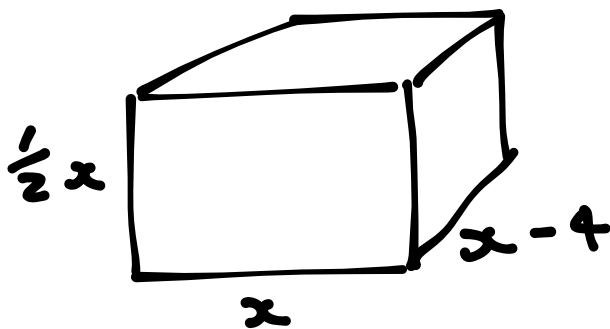
The surface area of the cuboid is 90 cm^2 .

Solve the equation $2x^2 - 6x - 45 = 0$ to work out the volume of the cuboid.

$$a = 2 \quad b = -6 \quad c = -45$$

$$x = \frac{6 \pm \sqrt{(-6)^2 - (4 \times 2 \times -45)}}{2 \times 2} \quad m_1$$

$$\underline{\underline{x = 6.47}} \quad m_1 \quad \cancel{x = -3.47}$$



$$\text{VOLUME} = \frac{1}{2} x \times x \times (x-4) \quad m_1$$

$$= \frac{1}{2} x^3 - 2x^2$$

$$= \frac{1}{2} (6.47)^3 - 2(6.47)^2 \quad m_1$$

$$= 51.6 - 51.9 \quad A_1$$

(5 marks)

ANSWER IN RANGE