



# EXAM PAPERS PRACTICE

GCSE OCR Math J560

Quadratic Formula

Answers

*"We will help you to  
achieve A Star "*



### Answer 1

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

Give your solutions correct to 3 significant figures.

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$
$$= \frac{5 \pm \sqrt{37}}{6}$$

$$= \underline{\underline{1.85}} \text{ or } \underline{\underline{-0.180}}$$

QUADRATIC FORMULA

$$ax^2 + bx + c = 0$$
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$a = 3$$

$$b = -5$$

$$c = -1$$

$$b^2 - 4ac = (-5)^2 - 4 \times 3 \times (-1)$$
$$= 37$$

### Answer 2

Solve  $3x^2 + 6x - 2 = 0$

Give your solutions correct to 2 decimal places.

$$x = \frac{-6 \pm \sqrt{60}}{6}$$

$$= 0.29099... \text{ or } -2.29099...$$

↓  
↓  
↓ < 5

$$= \underline{\underline{0.29}} \text{ or } \underline{\underline{-2.29}}$$

QUADRATIC FORMULA

$$ax^2 + bx + c = 0$$
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$a = 3$$

$$b = 6$$

$$c = -2$$

$$b^2 - 4ac = 6^2 - 4 \times 3 \times (-2)$$
$$= 36 + 24$$
$$= 60$$



**Answer 3**

Solve  $2x^2 + 3x - 7 = 0$   
Give your solutions correct to 2 decimal places.

$$x = \frac{-3 \pm \sqrt{65}}{2 \times 2}$$

$$= 1.26556...$$

OR  $-2.76556...$

1.27 OR -2.77 ROUND UP

QUADRATIC FORMULA

$$ax^2 + bx + c = 0$$
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$a = 2$$

$$b = 3$$

$$c = -7$$

$$b^2 - 4ac = 9 - 4 \times 2 \times (-7)$$
$$= 65$$

**Answer 4**

Solve  $5x^2 + 2x - 4 = 0$   
Give your solutions correct to 3 significant figures.  
Show your working clearly.

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = x$$

$$\frac{-2 \pm \sqrt{2^2 - 4(5)(-4)}}{10} = x = \frac{-2 \pm \sqrt{4 + 80}}{10}$$

$$\frac{-2 \pm \sqrt{84}}{10} = \frac{-2 \pm 9.165...}{10}$$

$$= -1.12 \text{ or } 0.717$$

-1.12 or 0.717



**Answer 5**

Solve  $3x^2 - 4x - 2 = 0$   
Give your solutions correct to 3 significant figures.

$$x = \frac{4 \pm \sqrt{40}}{6}$$

$$x = \underline{\underline{1.72}} \text{ or } \underline{\underline{-0.387}}$$

↑  
not "and"

QUADRATIC FORMULA

$$ax^2 + bx + c = 0$$
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$a = 3$$

$$b = -4$$

$$c = -2$$

$$b^2 - 4ac = 16 - 4 \times 3 \times -2$$
$$= 40$$

**Answer 6**

Solve the equation  $3x^2 + 4x - 12 = 0$   
Give your solutions correct to 2 decimal places.

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-4 \pm \sqrt{160}}{6}$$

$$x = \underline{\underline{1.44}}$$

$$\text{or } x = \underline{\underline{-2.77}}$$

QUADRATIC FORMULA

$$ax^2 + bx + c = 0$$
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$a = 3$$

$$b = 4$$

$$c = -12$$

$$b^2 - 4ac = 4^2 - 4 \times 3 \times (-12)$$
$$= 160$$





**Answer 7**

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

Give your solutions correct to 2 decimal places.

↓  
DOESN'T FACTORISE

$$x = \frac{1 \pm \sqrt{13}}{2 \times 3}$$

$$= 0.76759... \text{ or } -0.434258...$$

↓  
≥ 5  
↓  
ROUND UP

$$= \underline{0.77}$$

$$\text{OR } \underline{-0.43}$$

QUADRATIC FORMULA

$$ax^2 + bx + c = 0$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$a = 3$$

$$b = -1$$

$$c = -1$$

$$b^2 - 4ac = (-1)^2 - 4 \times 3 \times (-1)$$
$$= 1 + 12$$
$$= 13$$

**Answer 8**

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

Give your solutions correct to 3 significant figures.

$$x = \frac{5 \pm \sqrt{13}}{2}$$

$$= 4.30277...$$

↓  
< 5  
↓  
LEAVE ALONE

$$= 0.69722...$$

$$x = \underline{4.30} \text{ OR } \underline{0.697}$$

QUADRATIC FORMULA

$$ax^2 + bx + c = 0$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$a = 1$$

$$b = -5$$

$$c = 3$$

$$b^2 - 4ac = 25 - 4 \times 1 \times 3$$
$$= 25 - 12$$
$$= 13$$

$$(-5)^2 = 25$$



Answer 9

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

Give your solutions correct to 3 significant figures.

Show your working clearly.

Quadratic formula

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = x, \quad ax^2 + bx + c = 0$$

$$\frac{-(-2) \pm \sqrt{2^2 - 4(3)(-7)}}{2(3)}$$

$$\frac{-2 \pm \sqrt{4 + 84}}{6} = x$$

$$\frac{-2 \pm \sqrt{88}}{6} = x$$

$$x = 1.23, -1.90$$

$$x = 1.23, -1.90$$

Answer 10

(b) Work out the value of  $x$ .

$$2x^2 + x - 351 = 0$$

$$x = \frac{-1 \pm \sqrt{2809}}{2 \times 2}$$

$$x = 13 \quad (\text{OR } x = -\frac{27}{2})$$



$x = 13$  (As  $x$  must be positive).

NO ACCURACY GIVEN SO IT DOESN'T FACTORISE BUT WE WILL USE THE FORMULA

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

(3)



**Answer 11**

(a) Solve  $2x^2 + 9x - 7 = 0$

Give your solutions correct to 3 significant figures.

"CANNOT BE FACTORISED"

$$x = \frac{-9 \pm \sqrt{137}}{4}$$

$$x = \underline{0.676} \text{ or } \underline{-5.18}$$

QUADRATIC FORMULA

$$ax^2 + bx + c = 0$$
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$a = 2$$

$$b = 9$$

$$c = -7$$

$$b^2 - 4ac = 9^2 - 4 \times 2 \times (-7) = 137$$

**Answer 12**

Clare buys some shares for  $\$50x$ .

Later, she sells the shares for  $\$(600 + 5x)$ .

She makes a profit of  $x\%$

(a) Show that  $x^2 + 90x - 1200 = 0$

$$\% \text{ Profit} = \frac{\text{Sell} - \text{buy}}{\text{buy}} = \frac{(600 + 5x) - 50x}{50x}$$

$$\frac{x}{100} = \frac{(600 + 5x) - 50x}{50x} \rightarrow 50x^2 = 100(600 + 5x - 50x)$$

$\div 50$ , collect terms

$$\rightarrow 2(600 - 45x) = x^2$$

$$\therefore \underline{x^2 = 1200 - 90x}$$



**Answer 13**

Here is a hexagon.

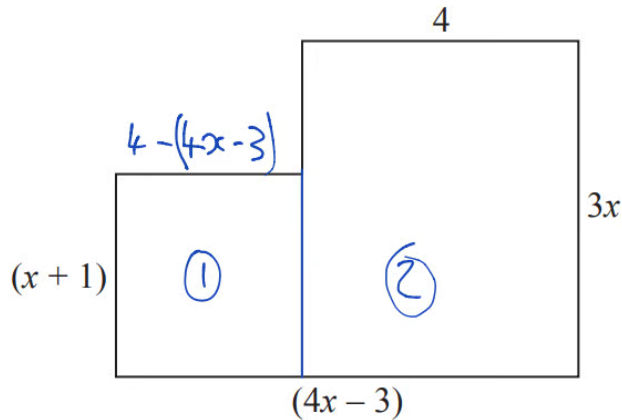


Diagram **NOT** accurately drawn

In the diagram, all the measurements are in centimetres.  
All the corners are right angles.

The area of the hexagon is  $40 \text{ cm}^2$

(a) Show that  $4x^2 + 9x - 47 = 0$

Total area of the hexagon is area 1 + area 2

$$\begin{aligned} \text{Area 1: } & ((4x-3) - 4)(x+1) \\ (4x-7)(x+1) &= 4x^2 - 7x + 4x - 7 = 4x^2 - 3x - 7 \end{aligned}$$

$$\text{Area 2: } (4) 3x = 12x$$

$$1 + 2 : 4x^2 + 9x - 7 = 40, \text{ therefore } 4x^2 + 9x - 47 = 0$$



**Answer 14**

The diagram shows a trapezium.

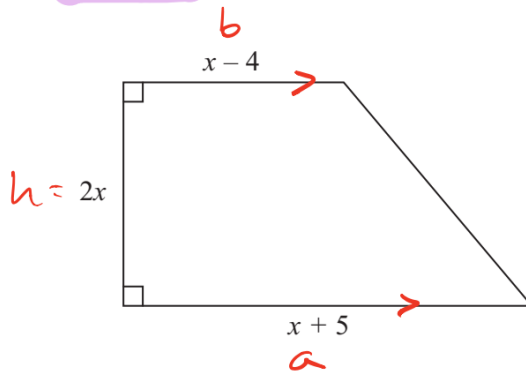


Diagram NOT accurately drawn

All the measurements are in centimetres.

The area of the trapezium is  $351 \text{ cm}^2$ .

(a) Show that  $2x^2 + x - 351 = 0$  ✓

$$A = \frac{1}{2}(a+b)h$$

$$351 = \frac{1}{2}(x+5 + x-4) \times 2x$$

$$351 = (2x + 1)x$$

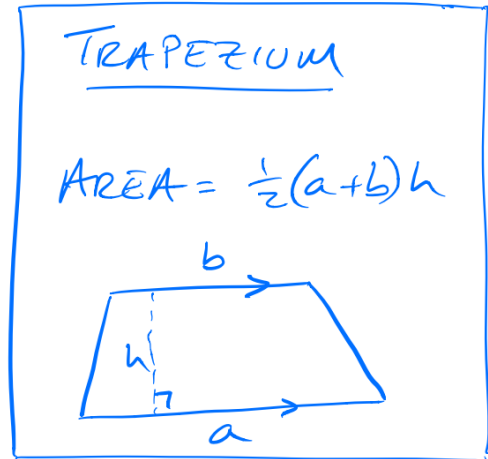
$$351 = 2x^2 + x$$

-351

-351



$$0 = 2x^2 + x - 351$$





**Answer 15**

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.

$$-b = -7 \Rightarrow \underline{\underline{b = 7}}$$

$$2a = 4 \Rightarrow \underline{\underline{a = 2}}$$

$$-4ac = -32$$

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

$$\frac{-8c}{-8} = \frac{-32}{-8}$$

$$\underline{\underline{c = 4}}$$

QUADRATIC FORMULA

$$ax^2 + bx + c = 0$$
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$\underline{\underline{2x^2 + 7x + 4 = 0}}$$