

Name: _____

Exam Style Questions



Quadratic Formula

Corbettmaths

Ensure you have: Pencil, pen, ruler, protractor, pair of compasses and eraser

You may use tracing paper if needed

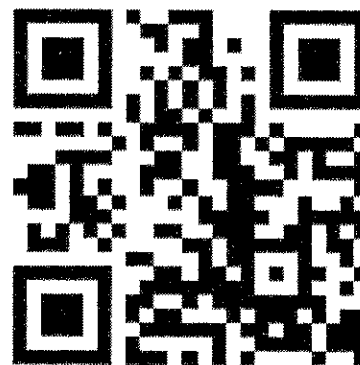
Guidance

1. Read each question carefully before you begin answering it.
2. Don't spend too long on one question.
3. Attempt every question.
4. Check your answers seem right.
5. Always show your workings

Revision for this topic

Secondary

Video 267



1. Write down the quadratic formula.

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \dots\dots\dots (1)$$

2. Solve the equation $x^2 + 5x + 1 = 0$

Give your answers to one decimal place.

$$\begin{aligned}
 a &= 1 & x &= \frac{-5 \pm \sqrt{25 - 4}}{2} \\
 b &= 5 & x &= \frac{-5 \pm \sqrt{21}}{2} \\
 c &= 1 & x &= \frac{-5 + \sqrt{21}}{2} \quad \text{or} \quad x = \frac{-5 - \sqrt{21}}{2} \\
 x &= \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} & x &= -0.208\dots \quad \text{or} \quad x = -4.79\dots \\
 x &= \frac{-5 \pm \sqrt{(5)^2 - 4 \times 1 \times 1}}{2 \times 1} & x &= -0.2 \dots \quad \text{or} \quad x = -4.8 \dots\dots\dots (3)
 \end{aligned}$$

3. Solve the equation $2x^2 + 6x + 1 = 0$

Give your answers to two decimal places.

$$\begin{aligned}
 a &= 2 & x &= \frac{-6 \pm \sqrt{36 - 8}}{4} \\
 b &= 6 & x &= \frac{-6 \pm \sqrt{28}}{4} \\
 c &= 1 & x &= \frac{-6 + \sqrt{28}}{4} \quad \text{or} \quad x = \frac{-6 - \sqrt{28}}{4} \\
 x &= \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} & x &= -0.17712\dots \quad \text{or} \quad x = -2.8228\dots \\
 x &= \frac{-6 \pm \sqrt{(6)^2 - 4 \times 2 \times 1}}{2 \times 2} & x &= -0.18 \dots \quad \text{or} \quad x = -2.82 \dots\dots\dots (3)
 \end{aligned}$$

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

Give your answers to two decimal places.

$$\begin{aligned}
 a &= 4 & x &= \frac{-1 \pm \sqrt{1 - (-112)}}{8} \\
 b &= 1 \\
 c &= -7 \\
 x &= \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} & x &= \frac{-1 \pm \sqrt{113}}{8} \\
 x &= \frac{-1 \pm \sqrt{1^2 - 4 \times 4 \times (-7)}}{2 \times 4} & x &= \frac{-1 + \sqrt{113}}{8} \quad \text{or} \quad x = \frac{-1 - \sqrt{113}}{8} \\
 & & x &= 1.20376\dots \quad \text{or} \quad x = -1.4537\dots \\
 & & x &= \underline{1.20} \dots \quad \text{or} \quad x = \underline{-1.45} \dots
 \end{aligned}$$

(3)

5. Solve the equation $x^2 - 2x - 9 = 0$

Give your answers to two decimal places.

$$\begin{aligned}
 a &= 1 & x &= \frac{2 \pm \sqrt{4 - (-36)}}{2} \\
 b &= -2 \\
 c &= -9 \\
 x &= \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} & x &= \frac{2 + \sqrt{40}}{2} \quad \text{or} \quad x = \frac{2 - \sqrt{40}}{2} \\
 x &= \frac{2 \pm \sqrt{(-2)^2 - 4 \times 1 \times (-9)}}{2 \times 1} & x &= 4.1622\dots \quad \text{or} \quad x = -2.1622\dots \\
 & & x &= \underline{4.16} \dots \quad \text{or} \quad x = \underline{-2.16} \dots
 \end{aligned}$$

(3)

6. Solve the quadratic equation $7x^2 - 25x + 2 = 0$

Give your answers to two decimal places.

$$\begin{aligned}
 a &= 7 & x &= \frac{25 \pm \sqrt{625 - 56}}{14} \\
 b &= -25 \\
 c &= 2 \\
 x &= \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} & x &= \frac{25 + \sqrt{569}}{14} \quad \text{or} \quad x = \frac{25 - \sqrt{569}}{14} \\
 x &= \frac{25 \pm \sqrt{(-25)^2 - 4 \times 7 \times 2}}{2 \times 7} & x &= 3.489\dots \quad \text{or} \quad x = 0.08187\dots \\
 & & x &= \underline{3.49} \dots \quad \text{or} \quad x = \underline{0.08} \dots
 \end{aligned}$$

(3)

7. Solve the equation $3x^2 + 10x + 5 = 7$

Give your answers to two decimal places.

$$3x^2 + 10x + 5 = 7$$

$$3x^2 + 10x - 2 = 0$$

$$a=3 \quad b=10 \quad c=-2$$

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

$$x = \frac{-10 \pm \sqrt{10^2 - 4 \times 3 \times (-2)}}{2 \times 3}$$

$$x = \frac{-10 \pm \sqrt{100 - (-24)}}{6}$$

$$x = \frac{-10 + \sqrt{124}}{6} \quad \text{or} \quad x = \frac{-10 - \sqrt{124}}{6}$$

$$x = 0.18925\dots$$

$$x = -3.522\dots$$

$$x = 0.19 \quad \text{or} \quad x = -3.52$$

(3)

8. Solve the equation $11x^2 = 7 - 2x$

Give your answers to two decimal places.

$$11x^2 = 7 - 2x$$

$$11x^2 - 7 = -2x$$

$$11x^2 + 2x - 7 = 0$$

$$a=11$$

$$b=2$$

$$c=-7$$

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

$$x = \frac{-2 \pm \sqrt{2^2 - 4 \times 11 \times (-7)}}{2 \times 11}$$

$$x = \frac{-2 \pm \sqrt{4 - (-308)}}{22}$$

$$x = \frac{-2 \pm \sqrt{312}}{22}$$

$$x = \frac{-2 + \sqrt{312}}{22} \quad \text{or} \quad x = \frac{-2 - \sqrt{312}}{22}$$

$$x = 0.7119\dots$$

$$x = -0.8937\dots$$

$$x = 0.71 \quad \text{or} \quad x = -0.89$$

(3)

9. Solve the equation $12x^2 - 13x + 4 = 13x^2 - 5x + 1$

Give your answers to one decimal place.

$$12x^2 - 13x + 4 = 13x^2 - 5x + 1$$

$$-12x^2 \quad -12x^2$$

$$-13x + 4 = x^2 - 5x + 1$$

$$+13x \quad +13x$$

$$4 = x^2 + 8x + 1$$

$$-4 \quad -4$$

$$0 = x^2 + 8x - 3$$

$$a=1$$

$$b=8$$

$$c=-3$$

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

$$x = \frac{-8 \pm \sqrt{8^2 - 4 \times 1 \times (-3)}}{2 \times 1}$$

$$x = \frac{-8 \pm \sqrt{64 - (-12)}}{2}$$

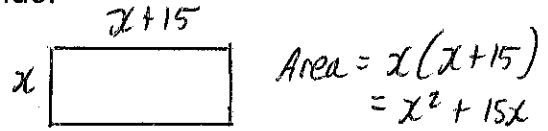
$$x = \frac{-8 \pm \sqrt{76}}{2}$$

$$x = \frac{-8 + \sqrt{76}}{2} \quad \text{or} \quad x = \frac{-8 - \sqrt{76}}{2}$$

$$x = 0.4 \quad \text{or} \quad x = -8.4$$

(3)

10. A rectangular field is 15m longer than it is wide.
The area of the field is 800m²



Work out the length of the field.
Give your answer to 1 decimal place.

$$\begin{aligned} \text{Area} &= x(x+15) \\ &= x^2 + 15x \\ \text{So } x^2 + 15x &= 800 \\ &\quad -800 \quad -800 \\ x^2 + 15x - 800 &= 0 \end{aligned}$$

$$\begin{aligned} a &= 1 \\ b &= 15 \\ c &= -800 \end{aligned}$$

$$x = \frac{-15 \pm \sqrt{3425}}{2} \quad \text{or} \quad x = \frac{-15 - \sqrt{3425}}{2}$$

$$x = 21.76... \checkmark \quad \text{or} \quad x = -36.76 \times$$

this solution does not make sense in this context,
as x is the width of a field

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

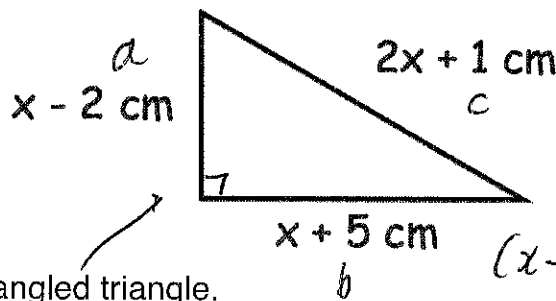
$$x = \frac{-15 \pm \sqrt{225 - (4 \times 1 \times -800)}}{2}$$

$$x = \frac{-15 \pm \sqrt{3425}}{2}$$

width = 21.8m (to 1 dp)

length is 15m longer so is \rightarrow 36.8m (4)

- 11.



Pythagoras

$$a^2 + b^2 = c^2$$

$$(x-2)^2 + (x+5)^2 = (2x+1)^2$$

$$(x-2)(x-2) + (x+5)(x+5) = (2x+1)(2x+1)$$

Shown is a right angled triangle.

- (a) Show that $x^2 - x - 14 = 0$

$$\begin{aligned} 2a &= 2x^2 - 2x + 1 \\ -2a &\quad \quad -2a \end{aligned}$$

$$0 = 2x^2 - 2x - 28$$

$$\div 2 \quad \div 2$$

$$0 = x^2 - x - 14$$

QED

$$x^2 - 2x - 2x + 4 + (x^2 + 5x + 5x + 25) = 4x^2 + 2x + 2x + 1$$

$$x^2 - 4x + 4 + x^2 + 10x + 25 = 4x^2 + 4x + 1$$

$$2x^2 + 6x + 29 = 4x^2 + 4x + 1$$

$$\begin{aligned} -2x^2 &\quad \quad -2x^2 \\ 6x + 29 &= 2x^2 + 4x + 1 \end{aligned}$$

$$\begin{aligned} -6x &\quad \quad -6x \\ 29 &= 2x^2 - 2x + 1 \end{aligned}$$

(3)

- (b) Find x .

$$\begin{aligned} a &= 1 \\ b &= -1 \\ c &= -14 \end{aligned}$$

$$x = \frac{1 \pm \sqrt{1 - 4 \times 1 \times (-14)}}{2} = \frac{1 \pm \sqrt{57}}{2}$$

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

$$x = \frac{1 \pm \sqrt{(-1)^2 - 4 \times 1 \times (-14)}}{2 \times 1}$$

$$x = \frac{1 + \sqrt{57}}{2} \quad \text{or} \quad x = \frac{1 - \sqrt{57}}{2}$$

$$x = 4.2749... \quad \text{or} \quad x = -3.274... \quad \dots \text{cm}$$

4.27 to (2dp)

(3)

would not make sense in this context,
as the height of the triangle is $x-2$

12. Solve, giving your answers to two decimal places.

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

$$x = \frac{-19 \pm \sqrt{19^2 - 4 \times 1 \times 83}}{2 \times 1}$$

$$x = \frac{-19 \pm \sqrt{361 - 332}}{2}$$

$$x = \frac{-19 \pm \sqrt{29}}{2}$$

$$x = \frac{-19 + \sqrt{29}}{2} \quad \text{or} \quad x = \frac{-19 - \sqrt{29}}{2}$$

$$\frac{7}{m+9} = m+10$$

$$\frac{7}{m+9} = m+10$$

$$x(m+9) \quad x(m+9)$$

$$7 = (m+10)(m+9)$$

$$7 = m^2 + 9m + 10m + 90$$

$$-7 \qquad \qquad \qquad -7$$

$$0 = m^2 + 9m + 10m + 90 - 7$$

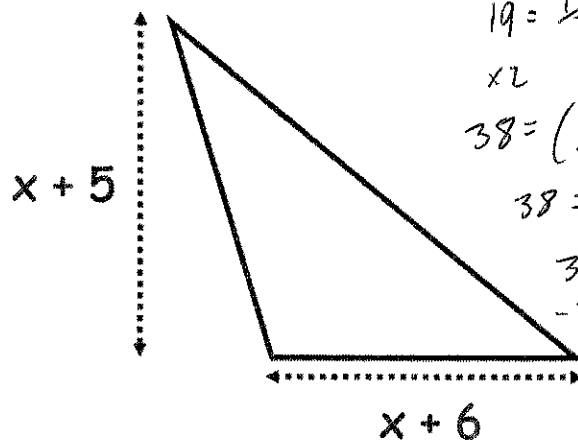
$$0 = m^2 + 19m + 83$$

$$a=1 \quad b=19 \quad c=83$$

$$m = -6.81 \dots \quad \text{or} \quad m = -12.19 \dots$$

(3)

13. Shown is a triangle with area 19cm².



$$\text{Area} = \frac{1}{2} \text{base} \times \text{height}$$

$$19 = \frac{1}{2}(x+6)(x+5)$$

$$\times 2 \qquad \times 2$$

$$38 = (x+6)(x+5)$$

$$38 = x^2 + 5x + 6x + 30$$

$$38 = x^2 + 11x + 30$$

$$-38 \qquad \qquad \qquad -38$$

$$0 = x^2 + 11x - 8$$

$$a=1 \quad b=11 \quad c=-8$$

Find the value of x

$$x = \frac{-11 \pm \sqrt{121 - 4 \times 1 \times (-8)}}{2}$$

$$x = \frac{-11 \pm \sqrt{153}}{2}$$

$$x = \frac{-11 + \sqrt{153}}{2} \quad \text{or} \quad x = \frac{-11 - \sqrt{153}}{2}$$

$$x = 0.684 \dots \quad \text{or} \quad x = -11.68 \dots \quad x = 0.6847 \text{ to 4 dp.}$$

(4)

so the height is $x+5$,
 $x = -11.68 \dots$ would lead to
 a negative height.