



The Quadratic Formula Exam Practice

Q1. Solve the equation $x^2 + 3x - 15 = 0$, giving your answers to 1 decimal place.

using $\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ with :

$a = 1, b = 3, c = -15$

$x = 2.65 \dots - 5.65 \dots$

Answer: 2.65, -5.65
(3 marks)

Q2. Solve the equation $2x^2 - 11x - 24 = 0$, giving your answers to 1 decimal place.

Answer: 7.2, -1.7
(3 marks)



Q3. Solve the equation $3a^2 - 2a - 32 = 0$, giving your answers to 2 decimal places.

Answer: 3.62, -2.95
(3 marks)

Q4. Solve the equation $14c^2 - 160 = 0$, giving your answers to 2 decimal places.

$$a = 14, b = 0, c = -160$$

Answer: 3.38, -3.38
(3 marks)



Q5. Solve the following equation correct to 3 decimal places:

$$6x^2 = 4 - 13x$$

$$6x^2 + 13x - 4 = 0$$

$$\Rightarrow a = 6, b = 13, c = -4$$

Answer: 0.273, -2.440
(3 marks)

Q6. Solve the following equation correct to 1 decimal place:

$$y^2 - 24y = 3y^2 - 38$$

$$0 = 2y^2 + 24y - 38$$

Answer: 1.4, -13.4
(3 marks)



Q7. Solve the equation below, giving your answers in the form $a \pm \sqrt{b}$ where a and b are whole numbers:

$$a^2 = -6a + 52$$

$$\Rightarrow a^2 + 6a - 52 = 0$$

$$\frac{-6 \pm \sqrt{6^2 - 4(1)(-52)}}{2}$$

$$\frac{-6 \pm \sqrt{244}}{2}$$

Answer: $-3 \pm \sqrt{61}$
(3 marks)

Q8. Show that the equation $2x = 23 - \frac{44}{x}$ can be written in the form:

a) $2x^2 - 23x + 44 = 0$

$$2x = 23 - \frac{44}{x}$$

$$\frac{44}{x} = 23 - 2x$$

$$44 = 23x - 2x^2$$

$$2x^2 - 23x + 44 = 0$$

Answer: _____
(2 marks)

b) Hence solve the equation: $2x = 23 - \frac{44}{x}$, giving your answers to 1 significant figure.

$$a = 2, b = -23, c = 44$$

Answer: $9, 2$
(2 marks)



Q9. Solve the equation $10x^3 + 5x^2 - 4x = 0$, giving your answers to 1 decimal place.

$$x(10x^2 + 5x - 4) = 0$$

$x = 0$, use quadratic formula with $a = 10, b = 5, c = -4$

$$0.43, -0.93$$

Answer: 0, 0.4, -0.9
(3 marks)

Applied Mixed Practice Problems

Q10. The sum of a number and its reciprocal is $\frac{31}{4}$.

a) Show that $4x^2 - 31x + 4 = 0$.

$$x + \frac{1}{x} = \frac{31}{4}$$

$$\frac{1}{x} = \frac{31}{4} - x$$

$$\textcircled{\times 4} \quad 1 = \frac{31x}{4} - x^2 \quad \textcircled{\times 4}$$

$$4 = 31x - 4x^2$$

$$4x^2 - 31x + 4 = 0$$

Answer: _____
(2 marks)

b) Find the possible values of x correct to 2 significant figures.

$$a = 4, b = -31, c = 4$$

$$7.61, 0.131\dots$$

Answer: 7.6, 0.13
(3 marks)



Q11. A mini - computer can sort a list of n numbers in order of size in T milliseconds according to the following rule:

$$T = 0.000380n^2 + 0.00145n - 6.15$$

a) How long, in seconds, does it take the computer to sort 10,000 numbers?

Substitute $n = 10,000$

$$\Rightarrow T = 38008.35 \text{ ms}$$

$$1 \text{ second} = 1000 \text{ ms}$$

$$\Rightarrow T = 38.00835 \text{ seconds}$$

Answer: 38 seconds
(2 marks)

b) How many numbers can the computer sort in 1 second?

Solve $1000 = 0.000380n^2 + 0.00145n - 6.15$

$$\Rightarrow 0.000380n^2 + 0.00145n - 1006.15$$

$$n = 1625.28, \dots -1629, \dots$$

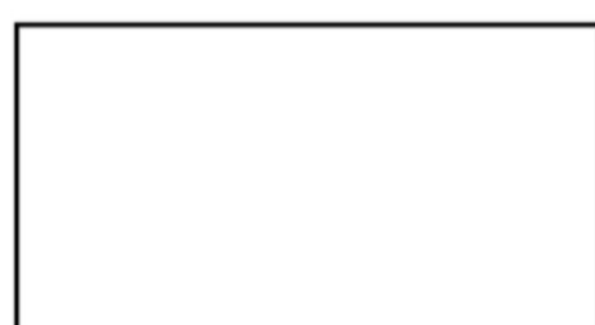
$$n = 1625$$

(tryed)

Answer: 1625
(2 marks)

Q12. The area of the rectangle below is 88 cm^2 . By finding and solving a suitable quadratic equation, work out the value of x to 1 decimal place.

$$2x + 11$$



$$x - 3$$

$$(2x + 11)(x - 3) = 88$$

$$2x^2 + 5x - 33 - 88 = 0$$

$$2x^2 + 5x - 121 = 0$$

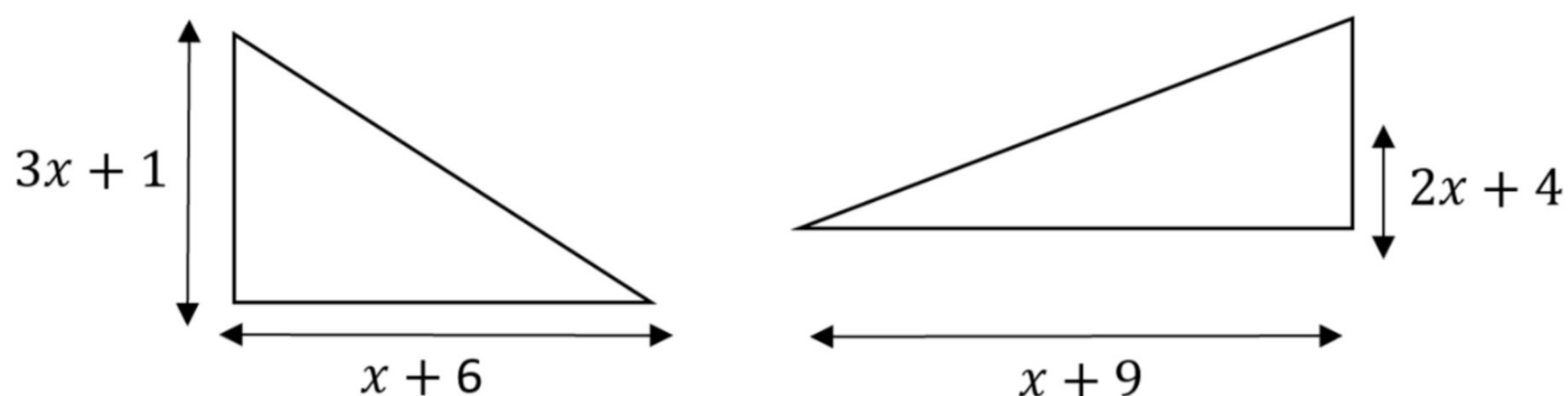
$$a = 2, b = 5, c = -121$$

$$x = 6. (2, \dots -9.12, \dots)$$

Answer: 6.6
(4 marks)



Q13. The area of the two right-angled triangles below are the same.
Find this area, correct to 2 decimal places.



$$\frac{1}{2}(x+6)(3x+1) = \frac{1}{2}(x+9)(2x+4)$$

$$3x^2 + 19x + 6 = 2x^2 + 22x + 36$$

$$x^2 - 3x - 30 = 0$$

$$7.18, -4.18$$

Answer: 7.18, -4.18

(5 marks)



Q14. Using algebra, find the points of intersection of the line $y = 7x - 3$ and the curve $y = 2x^2 - 5x + 11$ correct to 1 decimal place.

$$\left. \begin{array}{l} y = 2x^2 - 5x + 11 \\ y = 7x - 3 \end{array} \right\} 2x^2 - 5x + 11 = 7x - 3$$

$$\Rightarrow 2x^2 - 12x + 14 = 0$$

$$a = 2, \quad b = -12, \quad c = 14$$

$$\Rightarrow x = \frac{12 \pm \sqrt{144 - 112}}{4} = \frac{12 \pm \sqrt{32}}{4} = \frac{12 \pm 4\sqrt{2}}{4} = 3 \pm \sqrt{2}$$

$$\Rightarrow y = 7(3 + \sqrt{2}) - 3, \quad y = 7(3 - \sqrt{2}) - 3$$
$$= 18 + 7\sqrt{2}, \quad 18 - 7\sqrt{2}$$

$$(4.4, 27.9), (1.6, 8.1)$$

Answer: $(4.4, 27.9), (1.6, 8.1)$
(5 marks)