

FREE SAMPLE: THE FIRST QUESTION

Question 1 (30 marks)

(a) Solve the following equation, where $x \in \mathbb{R}$:

$$\frac{x-4}{3} + \frac{x+3}{4} = 7$$

[10 marks]

(b) Solve the following equation in x :

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

Give each answer correct to 2 decimal places.

[10 marks]

(c) Express as a single fraction in its simplest form:

$$\frac{5x-4}{5} + \frac{3x-5}{6}$$

[10 marks]

DISTRIBUTION

THE WORKED ANSWER TO THAT QUESTION

Question 1 (30 marks) [Algebra and equations]

(a) Solve the following equation, where $x \in \mathbb{R}$: $\frac{x-4}{3} + \frac{x+3}{4} = 7$

(a) Answer: $x = 13$

- Multiply every term by the lowest common multiple of 3 and 4, which is 12.
- $12\frac{x-4}{3} + 12\frac{x+3}{4} = 84$, so $4(x-4) + 3(x+3) = 84$.
- Expand and collect: $7x - 7 = 84$.
- $x = (84 - (-7)) / 7 = 13$.

KEY TAKEAWAY

Linear equations: remove brackets or clear fractions first, collect x terms on one side and numbers on the other, then divide; check by substituting back.

(b) Solve the following equation in x : $x^2 + 8x - 2 = 0$ Give each answer correct to 2 decimal places.

(b) Answer: $x = -8.24$ or $x = 0.24$

- Compare with $ax^2 + bx + c = 0$: $a = 1$, $b = 8$, $c = -2$.
- Write the formula $x = (-b \pm \sqrt{(b^2 - 4ac)}) / 2a$ and substitute: $x = (-8 \pm \sqrt{(8)^2 - 4(1)(-2)}) / 2$.
- Work out the part under the root: $(8)^2 - 4(1)(-2) = 72$, and $\sqrt{72} = 8.4853$.
- $x = (-8 + 8.4853) / 2 = 0.24$ and $x = (-8 - 8.4853) / 2 = -8.24$.

KEY TAKEAWAY

Quadratic formula: copy a , b and c with their signs, find $b^2 - 4ac$ first, and keep 4 decimals until the final rounding.

(c) Express as a single fraction in its simplest form: $\frac{5x-4}{5} + \frac{3x-5}{6}$

(c) Answer: $\frac{45x-49}{30}$

- The common denominator of 5 and 6 is 30.
- Write each fraction over 30: $6\frac{5x-4}{30} + 5\frac{3x-5}{30}$.
- Combine into one fraction and expand the brackets: $\frac{30x-24+15x-25}{30} = \frac{45x-49}{30}$.
- Check for a common factor in the numerator and denominator: there is none, so the answer is in simplest form.

KEY TAKEAWAY

Algebraic fractions: find a common denominator, multiply each numerator by the missing factor (use brackets), then combine and simplify.

LOS: Algebra and equations (Leaving Certificate Mathematics, Ordinary Level, Strand 4 Algebra)