NEW DISCOVERING MATHEMATICS
SECONDARY 3 (GRADE 9)
NON-CALCULATOR PRACTICE

Name: _____ **( ) Class:** _____ **Date:** _____

Chapter 1 – More About Quadratic Equations and Quadratic Functions (Worksheet A)

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1 Solve the following equations by the factorisation method.

(a) $x^2 + 14x + 48 = 0$

(b) $2x^2 + x - 28 = 0$

(c) $3x^2 - 48 = 0$

(d) $6x^2 - 23x + 7 = 0$

2 Find the possible values of b if each of the following expressions is a perfect square.

(a) $x^2 + bx + 4$

(b) $x^2 + (b + 3)x + 49$

3 For each of the following, express them in the form $(x + p)^2 + q$ or $-(x + p)^2 + q$, where p and q are constants.

(a) $x^2 + 4x + 4$

(b) $x^2 - 2x + 3$

(c) $-x^2 - 3x - 2$

(d) $-x^2 + 9x - 3$

4 Solve the following equations by the factorisation method.

(a) $x^2 - 6x = 4x - 21$

(b) $4x(x - 4) = 7(x - 4)$

(c) $(x + 12)(x - 3) = 9x$

5 Solve the following equations.

(a) $\frac{x+2}{3} = \frac{2}{x+7}$

(b) $\frac{1}{x+2} - \frac{1}{x-5} = \frac{7}{10}$

(c) $\frac{8-x}{x+7} + \frac{x+4}{3+x} = 4$

(d) $\frac{5}{x+1} - \frac{x+10}{x^2-x-2} = 15$

6 Solve the following equations by the complete the square method, leaving your answer in the form $x = p \pm \sqrt{q}$, where p and q are constants. State so if the equation has no solutions.

(a) $x^2 + 4x = 36$

(b) $(x + 3)(x + 2) = 9$

(c) $(x - 2)^2 = 5x - 2$

7 For each of the following,

(i) find the x-intercepts and the y-intercept,

(ii) sketch the graph of the function.

(a) $y = (x + 2)(x - 1)$

(b) $y = -(x + 6)(x - 4)$

8 For each of the following,

(i) find the line of symmetry and the coordinates of the turning point,

(ii) sketch the graph of the function.

(a) $y = x^2 + 5$

(b) $y = -(x + 2)^2 - 1$

9 **(a)** Draw the graph of $y = x^2 + 2x - 1$ for $-3 \leq x \leq 2$.

(b) Hence, solve the equation $x^2 + 2x - 1 = 0$ graphically.

10 **(a)** Draw the graph of $y = -2x^2 - x + 2$ for $-3 \leq x \leq 3$.

(b) Hence, solve the equation $-2x^2 - x + 2 = 0$ graphically.

11 The general term of a sequence is $T_n = n^2 + an + b$

(a) Find the values of a and b if both the 4th term and the 6th term are 0.

(b) Hence, find the possible values of p if the pth term is 8.

12 The difference between two positive numbers is 4. The sum of the squares of the two numbers is 106. Let the smaller number x.

(a) Form an equation in x and solve it.

(b) Hence, find the sum of the two numbers.

13 Martin and Nikki participated in 10 km run.
Martin ran at an average speed of x km/h.

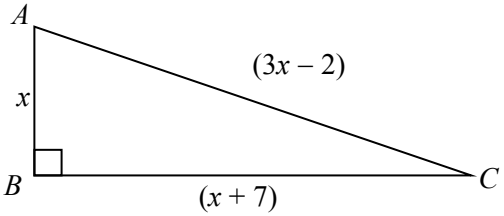
(a) Write down an expression, in terms of x, for the number of hours he took to complete the race.

(b) Nikki ran at an average speed which was 5 km/h less than Martin's speed. Write down an expression, in terms of x, for the number of hours she took to complete the race.

(c) The difference between their times taken to complete the race was 60 minutes. Write down an equation to represent the given information and show that it reduces to $x^2 - 5x - 50 = 0$.

(d) Solve the equation and find Nikki's average speed for the run.

14 In the diagram, ABC is a right-angled triangle with angle $ABC = 90°$, $AB = x$ cm, $BC = (x + 7)$ cm and $AC = (3x - 2)$ cm.



(a) Form down an equation in x and show that it reduces to $7x^2 - 26x - 45 = 0$.

(b) Solve the equation $7x^2 - 26x - 45 = 0$.

(c) Hence, solve the equation in **(b)** and find the length of the longest side of triangle ABC.

15 The price of element E was x dollars per kg in 2022.
Mr. Koh, a scientist, spent \$600 on element E in 2022.

(a) Write down an expression in terms of x for the amount of element E, in kg, received by Mr. Koh.

(b) In 2023, the price decreased by \$4 per kg and Mr. Koh spent \$672 on element E. Write down an expression in terms of x for the amount of element E, in kg, received by Mr. Koh for his 2023 purchase.

(c) The difference in between the amount of element E received by Mr. Koh in the two years is 2 kg.
Form an equation in x and show that it reduces to $x^2 - 40x - 1200 = 0$.

(d) Solve the equation in **(c)** and find the amount of element E Mr. Koh received in 2022.