

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

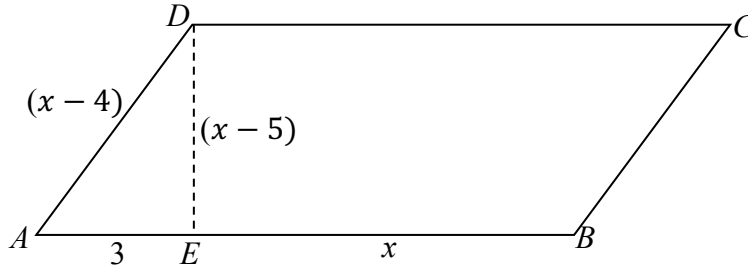
Name: _____ () Class: _____ Date: _____

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

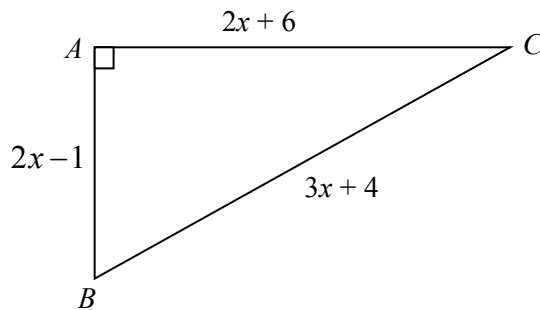
- 1 Solve the following equations by the factorisation method.
- (a) $x^2 + 7x - 18 = 0$
 - (b) $4x^2 + 16x + 15 = 0$
 - (c) $100x^2 - 4 = 0$
 - (d) $15x^2 - 19x + 6 = 0$
- 2 Find the possible values of b if each of the following expressions is a perfect square.
- (a) $x^2 + bx + 25$
 - (b) $x^2 + (b - 2)x + 36$
- 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) $x^2 + 6x + 3$
 - (b) $x^2 - 3x + 2$
 - (c) $-x^2 - 8x - 4$
 - (d) $-x^2 + 5x + 1$
- 4 Solve the following equations by the factorisation method.
- (a) $x(2x + 3) = 6(3 - x)$
 - (b) $6x(5x - 3) = 9(3 - 5x)$
 - (c) $(2x - 3)(x + 3) = 4x - 3$
- 5 Solve the following equations.
- (a) $\frac{x}{x-4} = x - 3$
 - (b) $\frac{x+6}{x-8} = \frac{x-2}{x-9}$
 - (c) $\frac{2+x}{4-x} + \frac{2-3x}{x+4} = \frac{4}{5}$

- 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) $x^2 - 30 = 14x$
 (b) $(x - 4)(x - 1) = 2x$
 (c) $(1 - x)(2 - 3x) = (2x + 1)(x + 1)$
- 7 For each of the following functions,
- (i) find the x -intercepts and the y -intercept of the graph of the function,
 (ii) sketch the graph of the function.
- (a) $y = (x + 3)(x - 4)$
 (b) $y = -(x + 2)(x + 6)$
- 8 For each of the following functions,
- (i) find the line of symmetry and the coordinates of the turning point of the graph of the function,
 (ii) sketch the graph of the function.
- (a) $y = (x - 2)^2 - 3$
 (b) $y = -(x + 4)^2 + 1$
- 9 (a) Draw the graph of $y = 2x^2 - x - 4$ for $-3 \leq x \leq 3$.
 (b) Hence, solve the equation $2x^2 - x - 4 = 0$ graphically.
- 10 (a) Draw the graph of $y = -x^2 - 3x + 6$ for $-5 \leq x \leq 2$.
 (b) Hence, solve the equation $-x^2 - 3x + 6 = 0$ graphically.
- 11 In a two-digit number, the ones digit is twice the tens digit.
 The number is twice the product of the digits.
 Let the tens digit be x .
- (a) Express the ones digit in terms of x .
 (b) Form an equation in x and solve it.
 (c) Hence, write down the two-digit number.

- 12** The diagram shows a parallelogram $ABCD$.
 E is a point on AB such that DE is perpendicular to AB .
 $AE = 3$ cm, $AD = (x - 4)$ cm, $EB = x$ cm and $DE = (x - 5)$ cm.



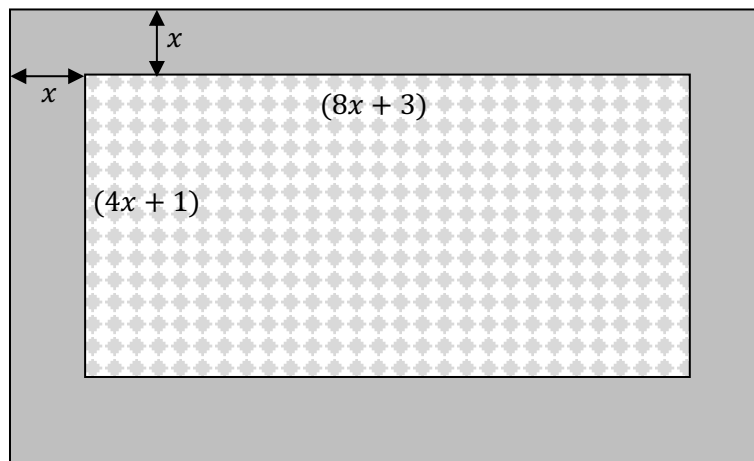
- (a) Write down an expression, in terms of x , for the area of $ABCD$.
 (b) Given that the area of $ABCD$ is 48 cm², form an equation involving x and show that it reduces to $x^2 - 2x - 63 = 0$.
 (c) Solve $x^2 - 2x - 63 = 0$ and find the perimeter of $ABCD$.
- 13** In the diagram, ABC is a right-angled triangle.
 $AB = (2x - 1)$ cm, $AC = (2x + 6)$ cm and $BC = (3x + 4)$ cm.



- (a) Form an equation in x and show that it simplifies to $x^2 + 4x - 21 = 0$.
 (b) Solve the equation $x^2 + 4x - 21 = 0$.
 (c) Find the area of the triangle ABC .
 (d) Hence, or otherwise, find the shortest distance from A to BC .

- 14** City P and City Q are 300 km apart.
 Abraham drove from City P to City Q in x hours.
 Balu took a train, which had an average speed 40 km/h slower than the average speed of Abraham's car, taking 2 hours longer than the same distance Abraham took.
- Write down an expression, in terms of x , for the average speed of Abraham's car.
 - Write down an expression, in terms of x , for the average speed of the train.
 - Form an equation in x and show that it reduces to $x^2 + 2x - 15 = 0$.
 - Solve the equation in (c) and find the average speed of the train.

- 15** The diagram shows a painting with dimensions $(8x + 3)$ cm and $(4x + 1)$ cm. The painting is attached to a board, leaving a margin of x cm around it.



- Form an expression, in terms of x , for the area of the margin between the painting and the sides of the board.
- Given that the area of the margin between the painting and the sides of the board is 128 cm^2 ,
 - form an equation in x to representing this information,
 - solve the equation in (b)(i) and find the area of the painting.