P1·1

Algebra and quadratics

CHAPTER ASSIGNMENT

Name _____ Class _____ No. _____ Date _____

Answer every question in the space given, showing all your working. Give exact answers (surds) unless a question asks for decimal places. Fractions are written a/b, with brackets where needed.

Practice questions from *Pure Mathematics 1* (Hodder Education, Sophie Goldie), Chapter 1 (Algebra), Exercises 1A to 1H, for classroom use. Where a question needs a diagram, the diagram is described in words. The Check yourself and Chapter quiz questions are Guru Jazzy's own.

Exercise 1A · Background algebra

1A.1 Simplify the following expressions by collecting like terms: (i) $8x + 3x + 4x - 6x$ · (ii) $3p + 3 + 5p - 7 - 7p - 9$ · (iii) $2k + 3m + 8n - 3k - 6m - 5n + 2k - m + n$ · (iv) $2a + 3b - 4c + 4a - 5b - 8c - 6a + 2b + 12c$ · (v) $r - 2s - t + 2r - 5t - 6r - 7t - s + 5s - 2t + 4r$

1A.2 Factorise the following expressions: (i) $4x + 8y$ · (ii) $12a + 15b - 18c$ · (iii) $72f - 36g - 48h$ · (iv) $p^2 - pq + pr$ · (v) $12k^2 + 144km - 72kn$

1A.3 Simplify the following expressions, factorising the answers where possible: (i) $8(3x + 2y) + 4(x + 3y)$ · (ii) $2(3a - 4b + 5c) - 3(2a - 5b - c)$ · (iii) $6(2p - 3q + 4r) - 5(2p - 6q - 3r) - 3(p - 4q + 2r)$ · (iv) $4(l + w + h) + 3(2l - w - 2h) + 5w$ · (v) $5u - 6(w - v) + 2(3u + 4w - v) - 11u$

1A.4 Simplify the following expressions, factorising the answers where possible: (i) $a(b + c) + a(b - c)$ · (ii) $k(m + n) - m(k + n)$ · (iii) $p(2q + r + 3s) - pr - s(3p + q)$ · (iv) $x(x - 2) - x(x - 6) + 8$ · (v) $x(x - 1) + 2(x - 1) - x(x + 1)$

1A.5 Perform the following multiplications, simplifying your answers: (i) $2xy \times 3x^2y$ · (ii) $5a^2bc^3 \times 2ab^2 \times 3c$ · (iii) $km \times mn \times nk$ · (iv) $3pq^2r \times 6p^2qr \times 9pqr^2$ · (v) $rs \times 2st \times 3tu \times 4ur$

1A.6 Simplify the following fractions as much as possible: (i) ab/ac · (ii) $2e/4f$ · (iii) $x^2/5x$ · (iv) $4a^2b/2ab$ · (v) $6p^2q^3r/3p^3q^3r^2$

1A.7 Simplify the following as much as possible: (i) $(a/b) \times (b/c) \times (c/a)$ · (ii) $(3x/2y) \times (8y/3z) \times (5z/4x)$ · (iii) $(p^2/q) \times (q^2/p)$ · (iv) $(2fg/16h) \times (4gh^2/4fh) \times (32fh^3/12f^3)$ · (v) $(kmn/3n^3) \times (6k^2m^3/2k^3m)$

1A.8 Write the following as single fractions: (i) $x/2 + x/3$ · (ii) $2x/5 - x/3 + 3x/4$ · (iii) $3z/8 + 2z/12 - 5z/24$ · (iv) $2x/3 - x/4$ · (v) $y/2 - 5y/8 + 4y/5$

1A.9 Write the following as single fractions: (i) $3/x + 5/x$ · (ii) $1/x + 1/y$ · (iii) $4/x + x/y$ · (iv) $p/q + q/p$ · (v) $1/a - 1/b + 1/c$

1A.10 Write the following as single fractions: (i) $(x + 1)/4 + (x - 1)/2$ · (ii) $(2x - 1)/3 - (x - 1)/5$ · (iii) $(3x - 5)/4 + (x - 7)/6$ · (iv) $3(2x + 1)/5 - 7(x - 2)/2$ · (v) $(4x + 1)/8 + (7x - 3)/12$

1A.11 Simplify the following expressions: (i) $(x + 3)/(2x + 6)$ · (ii) $6(2x + 1)^2/3(2x + 1)^5$ · (iii) $2x(y - 3)^4/8x^2(y - 3)$ · (iv) $(6x - 12)/(x - 2)$ · (v) $((3x + 2)^2/6x) \times (x^4/(6x + 4))$

Exercise 1B · Linear equations

1B.1 Solve the following equations: (i) $5a - 32 = 68$ · (ii) $4b - 6 = 3b + 2$ · (iii) $2c + 12 = 5c + 12$ · (iv) $5(2d + 8) = 2(3d + 24)$ · (v) $3(2e - 1) = 6(e + 2) + 3e$ · (vi) $7(2 - f) - 3(f - 4) = 10f - 4$ · (vii) $5g + 2(g - 9) = 3(2g - 5) + 11$ · (viii) $3(2h - 6) - 6(h + 5) = 2(4h - 4) - 10(h + 4)$ · (ix) $(1/2)k + (1/4)k = 36$ · (x) $(1/2)(l - 5) + l = 11$ · (xi) $(1/2)(3m + 5) + 1(1/2)(2m - 1) = 5(1/2)$ · (xii) $n + (1/3)(n + 1) + (1/4)(n + 2) = 5/6$

1B.2 The largest angle of a triangle is six times as big as the smallest. The third angle is 75°. (i) Write this information in the form of an equation for a, the size in degrees of the smallest angle. (ii) Solve the equation and so find the sizes of the three angles.

1B.3 Miriam and Saloma are twins and their sister Rohana is 2 years older than them. The total of their ages is 32 years. (i) Write this information in the form of an equation for r, Rohana's age in years. (ii) What are the ages of the three girls?

1B.4 The length, d m, of a rectangular field is 40 m greater than the width. The perimeter of the field is 400 m. (i) Write this information in the form of an equation for d. (ii) Solve the equation and so find the area of the field.

1B.5 Yash can buy three pencils and have 49c change, or he can buy five pencils and have 15c change. (i) Write this information as an equation for x, the cost in cents of one pencil. (ii) How much money did Yash have to start with?

1B.6 In a multiple-choice examination of 25 questions, four marks are given for each correct answer and two marks are deducted for each wrong answer. One mark is deducted for any question which is not attempted. A candidate attempts q questions and gets c correct. (i) Write down an expression for the candidate's total mark in terms of q and c. (ii) James attempts 22 questions and scores 55 marks. Write down and solve an equation for the number of questions which James gets right.

1B.7 Joe buys 18 kg of potatoes. Some of these are old potatoes at 22c per kilogram, the rest are new ones at 36c per kilogram. (i) Denoting the mass of old potatoes he buys by m kg, write down an expression for the total cost of Joe's potatoes. (ii) Joe pays with a $5 note and receives 20c change. What mass of new potatoes does he buy?

1B.8 In 18 years' time Hussein will be five times as old as he was 2 years ago. (i) Write this information in the form of an equation involving Hussein's present age, a years. (ii) How old is Hussein now?

Exercise 1C · Changing the subject of a formula

1C.1 Make (i) a (ii) t the subject in $v = u + at$.

1C.2 Make h the subject in $V = lwh$.

1C.3 Make r the subject in $A = \pi r^2$.

1C.4 Make (i) s (ii) u the subject in $v^2 - u^2 = 2as$.

1C.5 Make h the subject in $A = 2\pi rh + 2\pi r^2$.

1C.6 Make a the subject in $s = ut + (1/2)at^2$.

1C.7 Make b the subject in $h = \sqrt{(a^2 + b^2)}$.

1C.8 Make g the subject in $T = 2\pi\sqrt{(l/g)}$.

1C.9 Make m the subject in $E = mgh + (1/2)mv^2$.

1C.10 Make R the subject in $1/R = 1/R_1 + 1/R_2$.

1C.11 Make h the subject in $bh = 2A - ah$.

1C.12 Make u the subject in $f = uv/(u + v)$.

1C.13 Make d the subject in $u^2 - du + fd = 0$.

1C.14 Make V the subject in $p_1VM = mRT + p_2VM$.

Exercise 1D · Quadratic factorisation and equations

1D.1 Factorise the following expressions: (i) $al + am + bl + bm$ · (ii) $px + py - qx - qy$ · (iii) $ur - vr + us - vs$ · (iv) $m^2 + mn + pm + pn$ · (v) $x^2 - 3x + 2x - 6$ · (vi) $y^2 + 3y + 7y + 21$ · (vii) $z^2 - 5z + 5z - 25$ · (viii) $q^2 - 3q - 3q + 9$ · (ix) $2x^2 + 2x + 3x + 3$ · (x) $6v^2 + 3v - 20v - 10$

1D.2 Multiply out the following expressions and collect like terms: (i) $(a + 2)(a + 3)$ · (ii) $(b + 5)(b + 7)$ · (iii) $(c - 4)(c - 2)$ · (iv) $(d - 5)(d - 4)$ · (v) $(e + 6)(e - 1)$ · (vi) $(g - 3)(g + 3)$ · (vii) $(h + 5)^2$ · (viii) $(2i - 3)^2$ · (ix) $(a + b)(c + d)$ · (x) $(x + y)(x - y)$

1D.3 Factorise the following quadratic expressions: (i) $x^2 + 6x + 8$ · (ii) $x^2 - 6x + 8$ · (iii) $y^2 + 9y + 20$ · (iv) $r^2 + 2r - 15$ · (v) $r^2 - 2r - 15$ · (vi) $s^2 - 4s + 4$ · (vii) $x^2 - 5x - 6$ · (viii) $x^2 + 2x + 1$ · (ix) $a^2 - 9$ · (x) $(x + 3)^2 - 9$

1D.4 Factorise the following expressions: (i) $2x^2 + 5x + 2$ · (ii) $2x^2 - 5x + 2$ · (iii) $5x^2 + 11x + 2$ · (iv) $5x^2 - 11x + 2$ · (v) $2x^2 + 14x + 24$ · (vi) $4x^2 - 49$ · (vii) $6x^2 - 5x - 6$ · (viii) $9x^2 - 6x + 1$ · (ix) $t_1^2 - t_2^2$ · (x) $2x^2 - 11xy + 5y^2$

1D.5 Solve the following equations: (i) $x^2 - 11x + 24 = 0$ · (ii) $x^2 + 11x + 24 = 0$ · (iii) $x^2 - 11x + 18 = 0$ · (iv) $x^2 - 6x + 9 = 0$ · (v) $x^2 - 64 = 0$

1D.6 Solve the following equations: (i) $3x^2 - 5x + 2 = 0$ · (ii) $3x^2 + 5x + 2 = 0$ · (iii) $3x^2 - 5x - 2 = 0$ · (iv) $25x^2 - 16 = 0$ · (v) $9x^2 - 12x + 4 = 0$

1D.7 Solve the following equations: (i) $x^2 - x = 20$ · (ii) $(3x^2 + 5x)/3 = 4$ · (iii) $x^2 + 4 = 4x$ · (iv) $2x + 1 = 15/x$ · (v) $x - 1 = 6/x$ · (vi) $3x + 8/x = 14$

1D.8 Solve the following equations: (i) $x^4 - 5x^2 + 4 = 0$ · (ii) $x^4 - 10x^2 + 9 = 0$ · (iii) $9x^4 - 13x^2 + 4 = 0$ · (iv) $4x^4 - 25x^2 + 36 = 0$ · (v) $25x^4 - 4x^2 = 0$ · (vi) $x - 6\sqrt{x} + 5 = 0$ · (vii) $x^6 - 9x^3 + 8 = 0$ · (viii) $x - \sqrt{x} - 6 = 0$

1D.9 Find the real roots of the following equations: (i) $x^2 + 1 = 2/x^2$ · (ii) $x^2 = 1 + 12/x^2$ · (iii) $x^2 - 6 = 27/x^2$ · (iv) $1 + 1/x^2 - 20/x^4 = 0$ · (v) $9/x^4 + 4 = 13/x^2$ · (vi) $x^3 + 2/x^3 = 3$ · (vii) $\sqrt{x} + 8/\sqrt{x} = 6$ · (viii) $2 + 3/x = 7/\sqrt{x}$

1D.10 Find the real roots of the equation $9/x^4 + 8/x^2 = 1$.

1D.11 The length of a rectangular field is 30 m greater than its width, w metres. (i) Write down an expression for the area A m^2 of the field, in terms of w. (ii) The area of the field is 8800 m^2. Find its width and perimeter.

1D.12 A cylindrical tin of height h cm and radius r cm, has surface area, including its top and bottom, A cm^2. (i) Write down an expression for A in terms of r, h and π. (ii) A tin of height 6 cm has surface area 54π cm^2. What is the radius of the tin? (iii) Another tin has the same diameter as height. Its surface area is 150π cm^2. What is its radius?

1D.13 When the first n positive integers are added together, their sum is given by (1/2)n(n + 1). (i) Demonstrate that this result holds for the case n = 5. (ii) Find the value of n for which the sum is 105. (iii) What is the smallest value of n for which the sum exceeds 1000?

1D.14 The shortest side AB of a right-angled triangle is x cm long. The side BC is 1 cm longer than AB and the hypotenuse, AC, is 29 cm long. Form an equation for x and solve it to find the lengths of the three sides of the triangle.

Exercise 1E · Completing the square

1E.1 For each of the following equations: (a) write it in completed square form, (b) hence write down the equation of the line of symmetry and the co-ordinates of the vertex, (c) sketch the curve. (i) $y = x^2 + 4x + 9$ · (ii) $y = x^2 - 4x + 9$ · (iii) $y = x^2 + 4x + 3$ · (iv) $y = x^2 - 4x + 3$ · (v) $y = x^2 + 6x - 1$ · (vi) $y = x^2 - 10x$ · (vii) $y = x^2 + x + 2$ · (viii) $y = x^2 - 3x - 7$ · (ix) $y = x^2 - (1/2)x + 1$ · (x) $y = x^2 + 0.1x + 0.03$

1E.2 Write the following as quadratic expressions in descending powers of x: (i) $(x + 2)^2 - 3$ · (ii) $(x + 4)^2 - 4$ · (iii) $(x - 1)^2 + 2$ · (iv) $(x - 10)^2 + 12$ · (v) $(x - 1/2)^2 + 3/4$ · (vi) $(x + 0.1)^2 + 0.99$

1E.3 Write the following in completed square form: (i) $2x^2 + 4x + 6$ · (ii) $3x^2 - 18x - 27$ · (iii) $-x^2 - 2x + 5$ · (iv) $-2x^2 - 2x - 2$ · (v) $5x^2 - 10x + 7$ · (vi) $4x^2 - 4x - 4$ · (vii) $-3x^2 - 12x$ · (viii) $8x^2 + 24x - 2$

1E.4 The curves below all have equations of the form $y = x^2 + bx + c$. In each case find the values of b and c. (The diagrams are described here.) (i) A curve with its lowest point at (3, 1). (ii) A curve with its lowest point at (−1, −1); it passes through the origin. (iii) A curve with its lowest point at (4, 0), touching the x axis. (iv) A curve with its lowest point at (−3, 2), above the x axis.

1E.5 Solve the following equations by completing the square: (i) $x^2 - 6x + 3 = 0$ · (ii) $x^2 - 8x - 1 = 0$ · (iii) $x^2 - 3x + 1 = 0$ · (iv) $2x^2 - 6x + 1 = 0$ · (v) $5x^2 + 4x - 2 = 0$

Exercise 1F · The quadratic formula and the discriminant

1F.1 Use the quadratic formula to solve the following equations, where possible: (i) $x^2 + 8x + 5 = 0$ · (ii) $x^2 + 2x + 4 = 0$ · (iii) $x^2 - 5x - 19 = 0$ · (iv) $5x^2 - 3x + 4 = 0$ · (v) $3x^2 + 2x - 4 = 0$ · (vi) $x^2 - 12 = 0$

1F.2 Find the value of the discriminant and use it to find the number of real roots for each of the following equations: (i) $x^2 - 3x + 4 = 0$ · (ii) $x^2 - 3x - 4 = 0$ · (iii) $4x^2 - 3x = 0$ · (iv) $3x^2 + 8 = 0$ · (v) $3x^2 + 4x + 1 = 0$ · (vi) $x^2 + 10x + 25 = 0$

1F.3 Show that the equation $ax^2 + bx - a = 0$ has real roots for all values of a and b.

1F.4 Find the value(s) of k for which these equations have one repeated root: (i) $x^2 - 2x + k = 0$ · (ii) $3x^2 - 6x + k = 0$ · (iii) $kx^2 + 3x - 4 = 0$ · (iv) $2x^2 + kx + 8 = 0$ · (v) $3x^2 + 2kx - 3k = 0$

1F.5 The height h metres of a ball at time t seconds after it is thrown up in the air is given by the expression $h = 1 + 15t - 5t^2$. (i) Find the times at which the height is 11 m. (ii) Use your calculator to find the time at which the ball hits the ground. (iii) What is the greatest height the ball reaches?

Exercise 1G · Simultaneous equations

1G.1 Solve the following pairs of simultaneous equations: (i) $2x + 3y = 8$ and $3x + 2y = 7$ · (ii) $x + 4y = 16$ and $3x + 5y = 20$ · (iii) $7x + y = 15$ and $4x + 3y = 11$ · (iv) $5x - 2y = 3$ and $x + 4y = 5$ · (v) $8x - 3y = 21$ and $5x + y = 16$ · (vi) $8x + y = 32$ and $7x - 9y = 28$ · (vii) $4x + 3y = 5$ and $2x - 6y = -5$ · (viii) $3u - 2v = 17$ and $5u - 3v = 28$ · (ix) $4l - 3m = 2$ and $5l - 7m = 9$

1G.2 A student wishes to spend exactly \$10 at a second-hand bookshop. All the paperbacks are one price, all the hardbacks another. She can buy five paperbacks and eight hardbacks. Alternatively she can buy ten paperbacks and six hardbacks. (i) Write this information as a pair of simultaneous equations. (ii) Solve your equations to find the cost of each type of book.

1G.3 The cost of a pear is 5c greater than that of an apple. Eight apples and nine pears cost \$1.64. (i) Write this information as a pair of simultaneous equations. (ii) Solve your equations to find the cost of each type of fruit.

1G.4 A car journey of 380 km lasts 4 hours. Part of this is on a motorway at an average speed of 110 km h^{-1}, the rest on country roads at an average speed of 70 km h^{-1}. (i) Write this information as a pair of simultaneous equations. (ii) Solve your equations to find how many kilometres of the journey is spent on each type of road.

1G.5 Solve the following pairs of simultaneous equations: (i) $x^2 + y^2 = 10$ and $x + y = 4$ · (ii) $x^2 - 2y^2 = 8$ and $x + 2y = 8$ · (iii) $2x^2 + 3y = 12$ and $x - y = -1$ · (iv) $k^2 + km = 8$ and $m = k - 6$ · (v) $t_1^2 - t_2^2 = 75$ and $t_1 = 2t_2$ · (vi) $p + q + 5 = 0$ and $p^2 = q^2 + 5$ · (vii) $k(k - m) = 12$ and $k(k + m) = 60$ · (viii) $p_1^2 - p_2^2 = 0$ and $p_1 + p_2 = 2$

1G.6 The diagram shows the net of a cylindrical container of radius r cm and height h cm. (In the diagram, a rectangle of height h forms the curved surface, with a circle of radius r at each end; the full width of the metal sheet is 1 m, i.e. the rectangle plus the two circles fit along its width, and the shaded area is waste.) The surface area of the container is 1400π cm^2. (i) Write down a pair of simultaneous equations for r and h. (ii) Find the volume of the container, giving your answers in terms of π. (There are two possible answers.)

1G.7 A large window consists of six square panes of glass. (In the diagram the panes are in two rows of three; each pane is x m by x m, and the dividing wood, which forms a border and the bars between panes, is y m wide.) (i) Write down the total area of the whole window in terms of x and y. (ii) Show that the total area of the dividing wood is $7xy + 2y^2$. (iii) The total area of glass is 1.5 m^2, and the total area of dividing wood is 1 m^2. Find x, and hence find an equation for y and solve it. [MEI]

Exercise 1H · Inequalities

1H.1 Solve the following inequalities: (i) $5a + 6 > 2a + 24$ · (ii) $3b - 5 \leq b - 1$ · (iii) $4(c - 1) > 3(c - 2)$ · (iv) $d - 3(d + 2) \geq 2(1 + 2d)$ · (v) $(1/2)e + 3(1/2) < e$ · (vi) $-f - 2f - 3 < 4(1 + f)$ · (vii) $5(2 - 3g) + g \geq 8(2g - 4)$ · (viii) $3(h + 2) - 2(h - 4) > 7(h + 2)$

1H.2 Solve the following inequalities by sketching the curves of the functions involved: (i) $p^2 - 5p + 4 < 0$ · (ii) $p^2 - 5p + 4 \geq 0$ · (iii) $x^2 + 3x + 2 \leq 0$ · (iv) $x^2 + 3x > -2$ · (v) $y^2 - 2y - 3 > 0$ · (vi) $z(z - 1) \leq 20$ · (vii) $q^2 - 4q + 4 > 0$ · (viii) $y(y - 2) > 8$ · (ix) $3x^2 + 5x - 2 < 0$ · (x) $2y^2 - 11y - 6 \geq 0$ · (xi) $4x - 3 \geq x^2$ · (xii) $10y^2 > y + 3$

1H.3 Find the set of values of k for which each of these equations has two real roots: (i) $2x^2 - 3x + k = 0$ · (ii) $kx^2 + 4x - 1 = 0$ · (iii) $5x^2 + kx + 5 = 0$ · (iv) $3x^2 + 2kx + k = 0$

1H.4 Find the set of values of k for which each of these equations has no real roots: (i) $x^2 - 6x + k = 0$ · (ii) $kx^2 + x - 2 = 0$ · (iii) $4x^2 - kx + 4 = 0$ · (iv) $2kx^2 - kx + 1 = 0$

Check yourself

C1 Simplify $3(2x - 4y) - 4(x - 5y)$ and factorise the answer.

C2 Make x the subject of $y = (2x + 1)/(x - 3)$.

C3 Write $2x^2 - 12x + 7$ in the form $a(x + p)^2 + q$, and state the minimum value of the expression and the value of x where it occurs.

C4 Find the values of k for which $kx^2 - 6x + 3 = 0$ has two distinct real roots.

C5 Solve the simultaneous equations $y = 2x - 1$ and $x^2 + y^2 = 13$.

C6 Solve the inequality $2x^2 - x - 6 > 0$.

Chapter quiz

Q1 Factorise $2x^2 - 5x - 3$.

A	B	C	D
$(2x - 1)(x + 3)$	$(2x + 3)(x - 1)$	$(2x + 1)(x - 3)$	$(2x - 3)(x + 1)$

Q2 Make a the subject of $A = \frac{1}{2}(a + b)h$.

A	B	C	D
$a = 2A/h - b$	$a = 2A - bh$	$a = A/(2h) - b$	$a = 2Ah - b$

Q3 Write $x^2 - 6x + 2$ in the form $(x + p)^2 + q$.

A	B	C	D
$(x - 3)^2 + 11$	$(x + 3)^2 - 7$	$(x - 6)^2 - 34$	$(x - 3)^2 - 7$

Q4 What is the vertex of $y = x^2 + 4x + 9$?

A	B	C	D
(2, 5)	(−2, 5)	(−2, 13)	(−4, 9)

Q5 What is the greatest value of $14 - (x - 3)^2$?

A	B	C	D
3	14	11	−14

Q6 Find the discriminant of $3x^2 - 4x + 2$.

A	B	C	D
8	40	−40	−8

Q7 For which k does $x^2 - 2x + k = 0$ have one repeated root?

A	B	C	D
k = 1	k = 2	k = −1	k = 4

Q8 Solve $x^4 - 13x^2 + 36 = 0$.

A	B	C	D
x = 4 or 9	x = 2 or 3	x = ±2 or ±3	x = ±4 or ±9

Q9 Solve $x + 2y = 7$ and $x^2 + y^2 = 10$. Which pair is a solution?

A	B	C	D
$x = 3, y = 2$	$x = 7, y = 0$	$x = 2, y = 1$	$x = 1, y = 3$

Q10 Solve $-5y > 5$.

A	B	C	D
$y > -1$	$y < -1$	$y < 1$	$y > 1$

Q11 Solve $x^2 - 4x + 3 > 0$.

A	B	C	D
$1 < x < 3$	$x > 1$ or $x < 3$	$x < 1$ or $x > 3$	$x < -3$ or $x > -1$

Q12 For which values of k does $x^2 + kx + 4 = 0$ have real roots?

A	B	C	D
$k \le -4$ or $k \ge 4$	$-4 \le k \le 4$	$k \ge 4$ only	$k \le 16$

End of assignment · Check your answers against the chapter at gurujazzy.com/subjects/as-a-level-mathematics/p1-1-algebra-and-quadratics/