Harder Solving Quadratics with the

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1) Harder Solving Quadratics with the Formula: Easier

1. Solve $3x^2 + 7x - 13 = 0$
Give your solutions correct to 2 decimal places.

$a = 3 \quad b = 7 \quad c = -13$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{-7 \pm \sqrt{7^2 - 4 \times 3 \times -13}}{2 \times 3} = \frac{-7 \pm \sqrt{205}}{6}$$

$$= 1.219636844 \text{ or } -3.552970177$$

$x =$ 1.22 or $x =$ −3.55

(3 marks)

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2. Solve the equation

$$2x^2 + 6x - 95 = 0$$

Give your solutions correct to 3 significant figures.

$a = 2 \quad b = 6 \quad c = -95$

$$x = \frac{-6 \pm \sqrt{36 - (4 \times 2 \times -95)}}{4}$$

$$= \frac{-6 \pm \sqrt{796}}{4}$$

$$= 5.553367 99 \text{ or } -8.553367 99$$

$x =$ 5.55 or $x =$ −8.55

(3 marks)

1) Harder Solving Quadratics with the Formula: Medium

1) The product of two consecutive numbers is 1806. Let n be the smaller number.

a) Show that $n^2 + n - 1806 = 0$.

Solution: Product = multiply

$n(n - 1) = 1806$
$n^2 - n = 1806$
$n^2 - n - 1806 = 0$

(1 Mark)

b) Find the value of n.

Solution: Factorise

$n^2 + n - 1806 = 0$

$(n + 43)(n - 42) = 0$

$n = -43 \quad n = 42$

$42 \times 43 = 1806$

(2 Marks)

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2) The Hypotenuse of a right angle triangle is 6 cm longer than the base. The height is 3cm longer than the base. Find the length of all the sides.

Solution: Base = x Side = x + 3 Hypotenuse = x + 6

$x^2 + (x + 3)^2 = (x + 6)^2$

$x^2 + x^2 + 6x + 9 = x^2 + 12x + 36$
$2x^2 + 6x + 9 = x^2 + 12x + 36$
$x^2 - 6x - 27 = 0$
$(x + 3)(x - 9) = 0$
$x = -3 \quad x = 9$

So the Base = 9, Side = 12 and Hypotenuse = 15.

(4 Marks)

1) Harder Solving Quadratics with the Formula: Harder

3) Show that the equation has no solution:

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

Solution: $x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ a = 1 b = -3 c = 3

$$x = \frac{3 \pm \sqrt{(-3)^2 - 4 \times 1 \times 3}}{2 \times 1}$$

$$x = \frac{3 \pm \sqrt{-3}}{2}$$

Can't take the square root of a negative number therefore there is no solution

(3 Marks)

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4) Solution: $Area = \dfrac{1}{2} \times b \times h$

$$\frac{1}{2}(x)(x-1) = 4$$

$$x^2 - x = 8$$

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

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{1 \pm \sqrt{(-1)^2 - 4 \times 1 \times (-8)}}{2 \times 1}$$

$$x = \frac{1 \pm \sqrt{33}}{2}$$

So x = 3.37 or -2.37 but x cannot be negative

Perimeter: Base = 3.37 Height = 2.27 Hypotenuse = ?

To find the hypotenuse $c^2 = a^2 + b^2$

Important: Keep x = 3.372281323 in your Calculator or Memory

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c = 4.12cm

Perimeter = '4.12' + '2.27' + '3.37' = **9.87cm**

(4 Marks)