Name _____   [10M3 – 2010]

Year 10 - Quadratic Equations Test

- Time allowed: 40 minutes.
- Write all answers on the question paper.
- Show all working and give answers in simplest form.

Total

37

Question 1   (14 marks)

Solve the following:

a) $(r-5)(r+8)=0$

b) $3x(x-2)=0$

c) $y^2 - 21 = 0$

d) $a^2 - 9a - 36 = 0$

e) $(m+7)^2 = 13$

f) $3x^2 - 13x - 10 = 0$

g) $h^2 = 4h + 32$

h) $x^2 + 7 = 5 - 4x$

Question 2 (6 marks)

Solve the following:

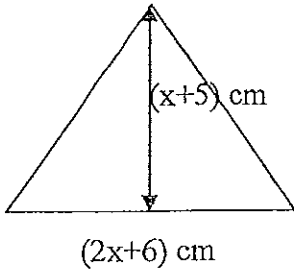| a) $x^2 + 5x - 5 = 0$ (Answer to 2 decimal places)	b) $2x^2 + 8x - 6 = 0$ (Solve using "Completing the square" method).

Question 3 (4 marks)

The sum of the squares of two consecutive positive odd integers is 13. Form an algebraic equation and solve it to find the integers.

Question 4 (5 marks)

If the area of the triangle drawn below is 80cm², find:

(a) the value of x.

(x+5) cm

(2x+6) cm

(b) the height and base lengths of the triangle.

Question 5 (3 marks)

182 chocolates are equally divided among a certain number of people at a function. If the number of chocolates that each person receives is 1 more than the number of people, find how many people were at the function.

Question 6

A right-angled triangle is drawn so that the hypotenuse is 5 times the shortest side, and the other side is twice the shortest side plus 1 cm. Find the length of the hypotenuse to 2 decimal places. (Include a diagram in your answer).

End of Test ☺

Name _Solutions (T. Brown) – S.G.H.S._

Year 10 – Quadratic Equations Test

[10M3 – 2010]

- Time allowed: 40 minutes.
- Write all answers on the question paper.
- Show all working and give answers in simplest form.

Total ☐ 37

Question 1 (14 marks)
Solve the following:

a) $(r-5)(r+8)=0$

$r = 5$ or -8 1

b) $3x(x-2)=0$

$x = 0$ or 2 1

c) $y^2 - 21 = 0$

$y^2 = 21$

$y = \pm\sqrt{21}$

$y = \sqrt{21}$ or $-\sqrt{21}$ 1

d) $z^2 - 9a - 36 = 0$

$(a-12)(a+3) = 0$

$a = 12$ or -3 1

e) $(m+7)^2 = 13$

$m+7 = \pm\sqrt{13}$

$m = -7 \pm \sqrt{13}$

$m = -7 + \sqrt{13}$
OR
$m = -7 - \sqrt{13}$ 2

f) $3x^2 - 13x - 10 = 0$

$3x^2 - 15x + 2x - 10 = 0$

$3x(x-5) + 2(x-5) = 0$

$(x-5)(3x+2) = 0$

$x = 5$ or $-\dfrac{2}{3}$

$\boxed{\begin{array}{l} P: -30x^2 \\ S: -13x \\ F: -15x, +2x \end{array}}$ 3

g) $h^2 = 4h + 32$

$h^2 - 4h - 32 = 0$

$(h-8)(h+4) = 0$

$h = 8$ or -4 2

h) $x^2 + 7 = 5 - 4x$

$x^2 + 4x + 2 = 0$

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

$= \dfrac{-4 \pm \sqrt{16 - 4(1)(2)}}{2}$

$= \dfrac{-4 \pm \sqrt{8}}{2}$

$= \dfrac{2(-2 \pm \sqrt{2})}{2}$

$= -2 \pm \sqrt{2}$

$x = -2 + \sqrt{2}$ or $x = -2 - \sqrt{2}$ 3

Question 2 (6 marks)
Solve the following:

a) $x^2 + 5x - 5 = 0$ (Answer to 2 decimal places)

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

$= \dfrac{-5 \pm \sqrt{25 - 4(1)(-5)}}{2}$

$= \dfrac{-5 \pm \sqrt{45}}{2}$

$\doteqdot 0.85$ or -5.85 3

b) $2x^2 + 8x - 6 = 0$ (Solve using "Completing the square" method).

$2(x^2 + 4x - 3) = 0$

$x^2 + 4x - 3 = 0$

$x^2 + 4x + 2^2 = 3 + 4$

$(x+2)^2 = 7$

$x+2 = \pm\sqrt{7}$

$x = -2 \pm \sqrt{7}$

$x = -2 + \sqrt{7}$ or $x = -2 - \sqrt{7}$ 3

Question 3 (4 marks)
The sum of the squares of two consecutive positive integers is 13. Form an algebraic equation and solve it to find the integers.

Let integers be x and $x+1$

$x^2 + (x+1)^2 = 13$

$x^2 + x^2 + 2x + 1 = 13$
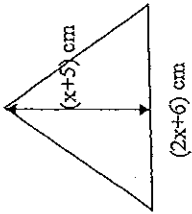
$2x^2 + 2x - 12 = 0$

$x^2 + x - 6 = 0$

$(x+3)(x-2) = 0$

$x = 2$ or -3

$\therefore x = 2$ (positive)

$\therefore$ integers are 2 and 3.

Question 4　　　　　　　　(5 marks)

The area of the triangle drawn below is 80cm². If the area of the triangle drawn below is 80cm², find:

(a) the value of x.

(x+5) cm

(2x+6) cm

$A = \frac{1}{2} bh$

$80 = \frac{1}{2}(2x+6)(x+5)$

$160 = 2x^2 + 10x + 6x + 30$

$0 = 2x^2 + 16x - 130$

$x^2 + 8x - 65 = 0$

$(x+13)(x-5) = 0$

$x = -13 \text{ or } 5$

$\therefore x = 5 \quad (\text{positive length})$

(b) the height and base lengths of the triangle.

$Height = x+5$

$= 5+5$

$= 10cm$

$Base = 2x+6$

$= 10+6$

$= 16cm$

Question 5　　　　　　　　(3 marks)

182 chocolates are equally divided among a certain number of people at a function. If the number of chocolates that each person receives is 1 more than the number of people, find how many people were at the function.

Let n = no. of people

$n(n+1) = 182$

$n^2 + n - 182 = 0$

$(n+14)(n-13) = 0$

$n = -14 \text{ or } 13 \quad (\text{positive no. of people})$

$\therefore n = 13$

$\therefore 13 \text{ people}$

Question 6　　　　　　　　(5 marks)

A right-angled triangle is drawn so that the hypotenuse is 5 times the shortest side, and the other side is twice the shortest side plus 1 cm. Find the length of the hypotenuse to 2 decimal places. (Include a diagram in your answer).

x　　$5x$

$2x+1$

$(5x)^2 = x^2 + (2x+1)^2$

$25x^2 = x^2 + 4x^2 + 4x + 1$

$25x^2 = 5x^2 + 4x + 1$

$20x^2 - 4x - 1 = 0$

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

$= \dfrac{\sqrt{4 \pm \sqrt{16 - 4(20)(-1)}}}{40}$

$= \dfrac{4 \pm \sqrt{96}}{40}$

$= \dfrac{4 \pm 4\sqrt{6}}{40}$

$\therefore x = \dfrac{1 \pm \sqrt{6}}{10} \quad (\text{positive length})$

$Hypotenuse = 5x$

$= \dfrac{\cancel{5}^{\,1}\left(\dfrac{1+\sqrt{6}}{\cancel{10}_{\,2}}\right)}{}$

$= \dfrac{1+\sqrt{6}}{2}$

$\doteqdot 1.72 \text{ cm} \ (2 \text{ dec.pl.})$

End of Test ☺