Name _____  SYDNEY GIRLS HIGH SCHOOL  [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:

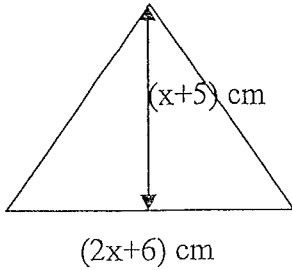| a) $x^2 + 5x - 5 = 0$ (Answer to 2 decimal places) | b) $2x^2 + 8x - 6 = 0$ (Solve using "Completing the square" method). |
|---|---|
| | |

**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 80cm$^2$, find:

(a) the value of x.



$(2x+6)$ 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** (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).

End of Test ☺

Name _Solutions (I. 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 $\boxed{\dfrac{37}{}}$

**Question 1**
Solve the following:                                                                        (14 marks)

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

$r = 5 \text{ or } -8$                                                               1

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

$x = 0 \text{ or } 2$                                                                  1

c) $y^2-21=0$

$y^2 = 21$

$y = \pm\sqrt{21}$

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

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

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

$a = 12 \text{ or } -3$                                                            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) $3x^2-13x-10=0$

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

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

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

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

$\begin{aligned} p&: -30x^2\\ s&: -13x\\ F&: -15x, +2x \end{aligned}$

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

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

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

$h = 8 \text{ or } -4$                                                              2

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

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

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

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

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

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

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

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

**Question 2**
Solve the following:                                                                        (6 marks)

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

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

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

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

$\doteqdot 0.85 \text{ or } -5.85$                                          3

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

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

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

$(x+2)^2 = 7$

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

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

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

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

Let integers be $x$ and $x+1$

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

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

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

$x^2 + x - 6 = 0$

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

$x = 2 \text{ or } -3$

$\therefore x = 2$   (positive)

$\therefore$ Integers are 2 and 3.

## 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).

(diagram: right triangle with sides $x$, $5x$, $2x+1$)

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

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

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

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

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

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

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

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

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

$Hypotenuse = 5x$

$= \dfrac{5}{1}\left(\dfrac{1+\sqrt{6}}{10_2}\right)$

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

$\doteqdot 1.72 \text{ cm} \,(2 \text{ dec.pl.})$  (1)

End of Test ☺

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## Question 4

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

(a) the value of x.

(diagram: triangle with $(x+5)$cm and $(2x+6)$ cm)

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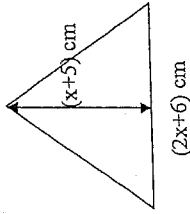
$80 = \frac{1}{2}(2x+6)(x+5)$

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

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

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

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

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

$\therefore x = 5$ (positive length)  (1)

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

$Height = x+5$
$= 5+5$
$= 10 \text{ cm}$

$Base = 2x+6$
$= 10+6$
$= 16 \text{ cm}$

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## Question 5

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

$n(n+1) = 182$

$n^2 + n - 182 = 0$

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

$n = -14 \text{ or } 13$

$\therefore n = 13$ (positive no. of people)  (1)

$\therefore 13 \text{ people}$