

# Quadratic Equations

Name: \_\_\_\_\_

Solve these showing working:  
and leaving answer in simplest surd form  
where necessary.

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

b)  $x^2 + 2x - 15 = 0$

c)  $x^2 = x$

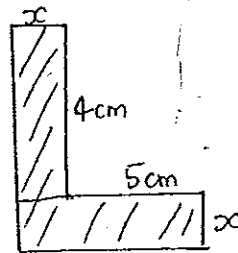
d)  $4x^2 + 19x = 5$

e)  $(3x-4)^2 = 8$

Q2: Solve by completing the square.  
 $x^2 + 12x - 28 = 0$

Q3: solve  $2(x+2) = \frac{1}{x}$

Q4 Solve for  $x$  if the area is  $19 \text{ cm}^2$



Q5 Solve for  $x$

$$\frac{3}{2x} + \frac{4}{3x} + \frac{5}{4x} = x$$

Q6

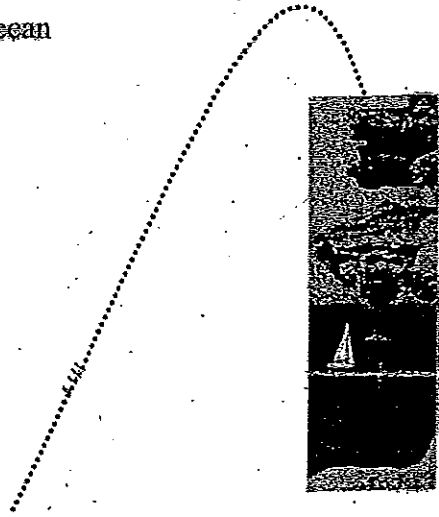
A stone is thrown from the top of a cliff to land in the ocean and its height  $h$  above sea level is given by

$$h = 84 + 13t - 2t^2$$

at any time  $t$ , where  $h$  is in metres and  $t$  is in seconds.

a. What is the height of this cliff?

b. How long will it take for the stone to land in the ocean?



# Quadratic Equations

Name: \_\_\_\_\_

Solve these Squaring working and leaving answer in simplest surd form where necessary.

1)  $(3x-2)(x+3) = 0$   
 $x = \frac{2}{3}$      $x = -3$

b)  $x^2 + 2x - 15 = 0$   
 $(x+5)(x-3) = 0$   
 $x = -5$      $x = 3$

c)  $x^2 = x$

$x^2 - x + (\frac{1}{2})^2 = 0 + (\frac{1}{2})^2$   
 $(x - \frac{1}{2})^2 = (\frac{1}{2})^2$   
 $x - \frac{1}{2} = \pm \frac{1}{2}$   
 $x = \frac{1}{2} \pm \frac{1}{2}$   
 $x = 0$      $x = 1$

d)  $4x^2 + 19x = 5$

$4x^2 + 19x - 5 = 0$   
 $(4x-1)(x+5) = 0$   
 $x = \frac{1}{4}$      $x = -5$

e)  $(3x-4)^2 = 8$

$3x-4 = \pm\sqrt{8}$   
 $3x = \pm\sqrt{8} + 4$   
 $x = \frac{\pm\sqrt{8} + 4}{3}$   
 $x = \frac{4 \pm 2\sqrt{2}}{3}$

Q2 Solve by completing the square.

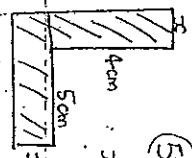
$x^2 + 12x - 28 = 0$

$x^2 + 12x = 28$   
 $x^2 + 12x + 6^2 = 28 + 6^2$   
 $(x+6)^2 = 64$   
 $x+6 = \pm 8$   
 $x = 2$      $x = -14$

Q3 Solve  $2(x+2) = \frac{1}{x}$

$2x+4 = \frac{1}{x}$   
 $2x^2 + 4x = 1$   
 $2x^2 + 4x - 1 = 0$   
 $a=2$      $b=4$      $c=-1$   
 $x = \frac{-4 \pm \sqrt{16 - 4(2)(-1)}}{2(2)}$   
 $x = \frac{-4 \pm \sqrt{24}}{4}$   
 $x = \frac{-4 \pm 2\sqrt{6}}{4}$   
 $x = \frac{-2 \pm \sqrt{6}}{2}$

Q4 Solve for x if the area is 19 cm<sup>2</sup>



$(5+x) \times x = 19$   
 $x^2 + 5x = 19$   
 $x^2 + 5x - 19 = 0$   
 $a=1$      $b=5$      $c=-19$   
 $x = \frac{-5 \pm \sqrt{81 - 4(1)(-19)}}{2}$   
 $x = \frac{-5 \pm \sqrt{157}}{2}$   
 $x = \frac{-5 + \sqrt{157}}{2}$   
 $x \approx 1.76$  cm

Q5 SOLVE FOR x

$\frac{12x}{2x} + \frac{4}{3x} + \frac{5}{4x} = x$

$12x^2 = 18 + 16 + 15$   
 $12x^2 = 49$   
 $x^2 = \frac{49}{12}$   
 $x = \pm \sqrt{\frac{49}{12}} = \pm \frac{7}{2\sqrt{3}}$   
 $= \pm \frac{7\sqrt{3}}{6}$

Q6

A stone is thrown from the top of a cliff to land in the ocean and its height h above sea level is given by

$h = 84 + 13t - 2t^2$

$h^2 - 13t = 84$   
 $4t^2 - 13t + (\frac{13}{2})^2 = 84 + (\frac{13}{2})^2$   
 $t^2 - \frac{13}{2}t + (\frac{13}{4})^2 = \frac{84 + (\frac{13}{2})^2}{4}$

\* a. What is the height of this cliff?

$h = 84 + 13t - 2t^2$   
 $2t^2 - 13t - 84 = h$   
 $t = 13 \pm \sqrt{169 - 4(2)(-84)}$   
 $t = \frac{13 \pm 29}{4}$

b. How long will it take for the stone to land in the ocean?

$t = \frac{13 \pm 29}{4}$   
 $t = 10.5$  seconds



\* (a) To find h

use  $t = \frac{-b}{2a}$   
 $h = 84 + 13(\frac{13}{4}) - 2(\frac{13}{4})^2$   
 $= \frac{13}{2} = 6.5$   
 $h = 84 + 13(6.5) - 2(6.5)^2$   
 $= 105.125$  m  
 $\approx 105$  m (to nearest m)