

Block: \_\_\_\_\_

Name: KEY

Chapter 3 Assignment – Quadratic Equations

/33

Show all of your work.

1) Solve by factoring:

a)  $x^2 - 3x = 18$  (1 mark)

$$\begin{aligned} x^2 - 3x - 18 &= 0 \\ \frac{-6 \times 3}{-6 + 3} &= -18 \\ (x-6)(x+3) &= 0 \\ x &= 6, -3 \end{aligned}$$

ANSWER:  $x = 6, -3$

b)  $\frac{2x^2}{2} + \frac{12x}{2} - \frac{110}{2} = \frac{0}{2}$  (2 marks)

$$\begin{aligned} x^2 + 6x - 55 &= 0 \\ (x+11)(x-5) &= 0 \\ x &= -11, 5 \end{aligned}$$

$\frac{11 \times -5 = -55}{11 + -5 = 6}$

ANSWER:  $x = -11, 5$

c)  $\frac{2n^2}{n} + \frac{7n}{n} = 0$  (1 mark)

$$\begin{aligned} n(2n+7) &= 0 \\ n &= 0, -\frac{7}{2} \end{aligned}$$

"right over left, change sign"

ANSWER:  $n = 0, -\frac{7}{2}$

d)  $\frac{4x^2}{4} - \frac{144}{4} = \frac{0}{4}$  (2 marks)

$$\begin{aligned} x^2 - 36 &= 0 \\ (x+6)(x-6) &= 0 \\ x &= -6, 6 \end{aligned}$$

"difference of squares"

ANSWER:  $x = \pm 6$

2) Solve by factoring:

a)  $3x^2 - 4x = 20$  (3 marks)

$$\begin{aligned} 3x^2 - 4x - 20 &= 0 \\ 3x^2 + 6x - 10x - 20 &= 0 \\ 3x(x+2) - 10(x+2) &= 0 \\ (x+2)(3x-10) &= 0 \\ x &= -2, \frac{10}{3} \end{aligned}$$

a=3... decomp!  
 $\frac{-10 \times 6 = -60}{-10 + 6 = -4}$   
(3)(-20)

ANSWER:  $x = -2, \frac{10}{3}$

b)  $2m^2 - 3m - 5 = 0$  (3 marks)

$$\begin{aligned} 2m^2 - 5m + 2m - 5 &= 0 \\ m(2m-5) + 1(2m-5) &= 0 \\ (2m-5)(m+1) &= 0 \\ m &= \frac{5}{2}, -1 \end{aligned}$$

a=2...! decomp!  
 $\frac{-5 \times 2 = -10}{-5 + 2 = -3}$   
(2)(-5)

ANSWER:  $m = \frac{5}{2}, -1$

3) Solve by **completing the square**. Radical answers should be in **exact form**.

a)  $x^2 - 2x = 11$  (2 marks)

$b = -2$ ;  $\left(-\frac{2}{2}\right)^2$  save;  $(-1)^2$  use

$$x^2 - 2x + 1 = 11 + 1$$

$$\sqrt{(x-1)^2} = \sqrt{12}$$

$$x - 1 = \pm\sqrt{4 \times 3}$$

$$x - 1 = \pm 2\sqrt{3}$$

$$x = 1 \pm 2\sqrt{3}$$

ANSWER:

$$x = 1 \pm 2\sqrt{3}$$

b)  $2x^2 + 4x - 5 = 0$  (2 marks)

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

$$\frac{2(x^2 + 2x)}{2} = \frac{5}{2}$$

$$x^2 + 2x = \frac{5}{2}$$

$b = 2$ ;  $\left(\frac{2}{2}\right)^2$  save;  $(1)^2$  use

$$x^2 + 2x + 1 = \frac{5}{2} + 1 \times \frac{2}{2}$$

$$\sqrt{(x+1)^2} = \sqrt{\frac{7}{2}}$$

$$x + 1 = \pm\sqrt{\frac{7}{2}} \times \frac{\sqrt{2}}{\sqrt{2}}$$

$$x + 1 = \pm\frac{\sqrt{14}}{2}$$

ANSWER:

$$x = \frac{-2 \pm \sqrt{14}}{2}$$

$$x + 1 = \frac{\pm\sqrt{14}}{2} \times \frac{-1 \times 2}{1 \times 2}$$

$$x = \frac{-2 \pm \sqrt{14}}{2}$$

4) Solve by **completing the square**. Answer(s) in **exact form** (3 marks):

$$3x^2 = -10x - 4$$

$$\frac{3x^2 + 10x}{3} = \frac{-4}{3}$$

$$3\left(x^2 + \frac{10}{3}x\right) = \frac{-4}{3}$$

$$x^2 + \frac{10}{3}x = \frac{-4}{3}$$

$b = \frac{10}{3}$ ;  $\left(\frac{5}{3}\right)^2$  save;  $\left(\frac{25}{9}\right)$  use

$$x^2 + \frac{10}{3}x + \frac{25}{9} = \frac{-4}{3} + \frac{25}{9}$$

$$\left(x + \frac{5}{3}\right)^2 = \frac{-12}{9} + \frac{25}{9}$$

$$\sqrt{\left(x + \frac{5}{3}\right)^2} = \sqrt{\frac{13}{9}}$$

$$x + \frac{5}{3} = \pm\frac{\sqrt{13}}{3}$$

$$x = \frac{-5 \pm \sqrt{13}}{3}$$

ANSWER:

$$x = \frac{-5 \pm \sqrt{13}}{3}$$

$$x = \frac{\pm\sqrt{13}}{3} - \frac{5}{3}$$

$$x = \frac{-5 \pm \sqrt{13}}{3}$$

5) Solve using the **quadratic formula**. Radical answers should be in **exact form** (2 marks each).

a)  $8x^2 + 10x + 3 = 0$

$a = 8$   $b = 10$   $c = 3$

$$x = \frac{-10 \pm \sqrt{(10)^2 - 4(8)(3)}}{2(8)}$$

$$x = \frac{-10 \pm \sqrt{100 - 96}}{16}$$

$$x = \frac{-10 \pm \sqrt{4}}{16}$$

ANSWER:

$$x = -\frac{1}{2}, -\frac{3}{4}$$

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

b)  $6x^2 - 3x - 2 = 0$

$a = 6$   
 $b = -3$   
 $c = -2$

$$x = \frac{-(-3) \pm \sqrt{(-3)^2 - 4(6)(-2)}}{2(6)}$$

$$x = \frac{3 \pm \sqrt{9 + 48}}{12}$$

$$x = \frac{3 \pm \sqrt{57}}{12}$$

ANSWER:

$$x = \frac{3 \pm \sqrt{57}}{12}$$

$x = \frac{-10 \pm 2}{16}$

pos  $\oplus$   
 $x = \frac{-10 + 2}{16}$   
 $x = \frac{-8}{16} = -\frac{1}{2}$

neg  $\ominus$   
 $x = \frac{-10 - 2}{16}$   
 $x = \frac{-12}{16} = -\frac{3}{4}$

"right over left,  
change the sign"

6) Write a quadratic equation in standard form with roots  $-\frac{3}{2}$  and  $\frac{4}{3}$  (2 marks).

$$x = -\frac{3}{2} \quad x = \frac{4}{3}$$

$$(2x + 3)(3x - 4) = 0 \text{ FOIL!}$$

$$6x^2 - 8x + 9x - 12 = 0$$

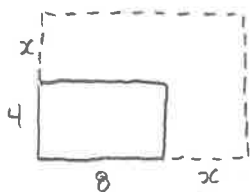
$$6x^2 + x - 12 = 0$$

ANSWER:

$$6x^2 + x - 12 = 0$$

7) The length and width of a rectangular sheet of plywood is 4m by 8m. How much must be added equally to the length and width to **triple the area**? Solve the problem using the **complete the square method** and give the answer to the **nearest hundredth** (4 marks).

let  $x =$  length added to length and width



FOIL!  $A_{\text{new}} = 3 \times A_{\text{old}}$

$$(4+x)(8+x) = 3(4)(8)$$

$$32 + 4x + 8x + x^2 = 96$$

$$x^2 + 12x + 32 = 96$$

$$x^2 + 12x = 64$$

$b = 12$ ;  $(6)$ ;  $(36)$   
save use

pos  
 $x = -6 + 10$   
 $x = 4$

neg  
 $x = -6 - 10$   
 $x = -16$

reject, can't add negative length!

$$x^2 + 12x + 36 = 64 + 36$$

$$\sqrt{(x+6)^2} = \sqrt{100}$$

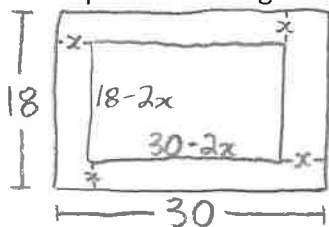
$$x+6 = \pm 10$$

$$x = -6 \pm 10$$

SENTENCE ANSWER:

You must add 4.00m to the length and width

8) A rectangular corral measures 30m by 18m. The corral has to be reduced to 70% of its original area to build a pathway around the corral for feeding and washing. This will be done by removing an equal distance off of each end of the length and the same distance off of each end of the width. Determine the **new length and width to the nearest hundredth**. Solve this problem using the **quadratic formula method** (4 marks). let  $x =$  length taken off of each end of  $l$  and  $w$



$$A_{\text{new}} = 70\% \text{ of old}$$

$$A_{\text{new}} = 0.7 \times A_{\text{old}}$$

$$(18-2x)(30-2x) = 0.7(18)(30)$$

$$540 - 36x - 60x + 4x^2 = 378$$

$$4x^2 - 96x + 540 = 378$$

$$\frac{4x^2}{2} - \frac{96x}{2} + \frac{162}{2} = \frac{0}{2}$$

$$2x^2 - 48x + 81 = 0 \quad a=2, b=-48, c=81$$

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

$$x = \frac{-(-48) \pm \sqrt{(-48)^2 - 4(2)(81)}}{2(2)}$$

$$x = \frac{48 \pm \sqrt{2304 - 648}}{4}$$

$$x = \frac{48 \pm \sqrt{1656}}{4} = \frac{48 \pm 40.694}{4}$$

pos  $x = 22.174$  neg  $x = 1.827$

$$W = 18 - 2(1.827) = 14.346$$

$$l = 30 - 2(1.827) = 26.346$$

SENTENCE ANSWER:

The new width is 14.35m, new length is 26.35m

reject... too big for situation!

