

Period: _____

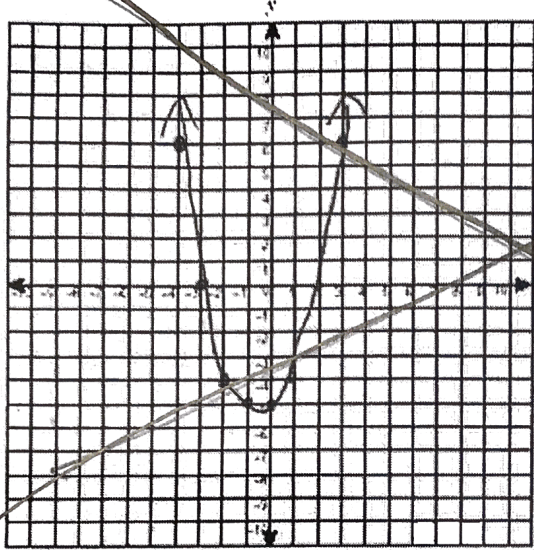
Name: Key

Chapter 6 Assignment - Quadratic Equations

/35

Show all of your work.

Solve by graphing the corresponding quadratic function (2 marks): $x^2 + x - 6 = 0$



x	y
-4	6
-3	0
-2	-4
-1	-6
0	-6
1	-4
2	0
3	6
4	14

$$y = x^2 + x - 6$$

$$= (-4)^2 + (-4) - 6$$

$$= 6$$

$$y = (-3)^2 + (-3) - 6 = 0$$

$$y = (-2)^2 + (-2) - 6 = -4$$

$$y = (-1)^2 + (-1) - 6 = -6$$

ANSWER:
 $x = -3$ or 2

Solve by factoring:

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

$$x^2 - 3x - 18 = 0$$

$$(x-6)(x+3) = 0$$

$$x = 6 \text{ or } -3$$

ANSWER: 6 or -3

b) $2x^2 + 12x - 110 = 0$ (2 marks)

$$\frac{2x^2}{2} + \frac{12x}{2} - \frac{110}{2} = \frac{0}{2}$$

$$x^2 + 6x - 55 = 0$$

$$(x+11)(x-5) = 0$$

ANSWER:
 $x = -11$ or 5

c) $2n^2 + 7n = 0$ (1 mark)

$$n(2n+7) = 0$$

$$n = 0$$

$$n = -\frac{7}{2}$$

ANSWER: 0 or $-\frac{7}{2}$

d) $4x^2 - 144 = 0$ (2 marks)

$$\frac{4x^2}{4} - \frac{144}{4} = \frac{0}{4}$$

$$x^2 - 36 = 0$$

$$(x-6)(x+6) = 0$$

ANSWER:
 $x = \pm 6$

18

2) Solve by factoring:

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

$$3x^2 - 4x - 20 = 0$$

$$3x^2 + 6x - 10x - 20 = 0$$

$$3x(x+2) - 10(x+2) = 0$$

$$(3x-10)(x+2) = 0$$

$$\frac{-10}{3} \times \frac{6}{1} = -60$$

$$\frac{-10}{3} + \frac{6}{1} = -4$$

$$x = -2$$

$$x = \frac{10}{3}$$

ANSWER:

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

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

$$2a^2 - 3a - 5 = 0$$

$$2a^2 + 2a - 5a - 5 = 0$$

$$2a(a+1) - 5(a+1) = 0$$

$$(2a-5)(a+1) = 0$$

$$a = -1 \quad a = \frac{5}{2}$$

$$\frac{-5}{2} \times \frac{2}{1} = -10$$

$$\frac{-5}{2} + \frac{2}{1} = -3$$

$$m+2 = -1$$

$$m = -3$$

$$m+2 = \frac{5}{2}$$

$$m = \frac{5}{2} - 2$$

$$= \frac{5-4}{2} = \frac{1}{2}$$

ANSWER:

$$m = -3, \frac{1}{2}$$

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

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

$$x^2 - 2x - 11 = 0$$

$$(x^2 - 2x + 1) - 11 = 0$$

$$(x^2 - 2x + 1) - 12 = 0$$

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

$$x-1 = \pm\sqrt{12}$$

$$x = 1 \pm \sqrt{12}$$

$$= 1 \pm \sqrt{4 \cdot 3}$$

ANSWER:

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

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

$$2(x^2 + 2x + 1) - 5 = 0$$

$$2(x^2 + 2x + 1) - 5 - 2 = 0$$

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

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

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

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

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

ANSWER:

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

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

10

$$\frac{10}{3} + 2 = \frac{10}{3} + \frac{6}{3} = \frac{16}{3} = \frac{4}{3}$$

4) Solve by completing the square. Answer(s) in exact form (3 marks): $3x^2 = -10x - 4$

$$\begin{aligned} 3x^2 + 10x &= -4 \\ 3(x^2 + \frac{10}{3}x) &= -\frac{4}{3} \\ x^2 + \frac{10}{3}x + \frac{25}{9} - \frac{25}{9} &= -\frac{4}{3} \\ (x^2 + \frac{10}{3}x + \frac{25}{9}) &= -\frac{4}{3} + \frac{25}{9} \end{aligned}$$

$$\begin{aligned} (x + \frac{5}{3})^2 &= \frac{-12}{9} + \frac{25}{9} \\ (x + \frac{5}{3})^2 &= \frac{13}{9} \\ x + \frac{5}{3} &= \pm \frac{\sqrt{13}}{3} \\ x &= -\frac{5}{3} \pm \frac{\sqrt{13}}{3} \end{aligned}$$

ANSWER: $\frac{-5 \pm \sqrt{13}}{3}$

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

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

$$\begin{aligned} x &= \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \\ &= \frac{-10 \pm \sqrt{(10)^2 - 4(8)(3)}}{2(8)} \\ &= \frac{-10 \pm \sqrt{100 - 96}}{16} \\ &= \frac{-10 \pm 2}{16} \end{aligned}$$

$$\begin{aligned} x &= \frac{-12}{16} = -\frac{3}{4} \\ x &= \frac{-8}{16} = -\frac{1}{2} \end{aligned}$$

ANSWER: $x = -\frac{3}{4}$ or $-\frac{1}{2}$

b) $6x^2 - 3x = +2$ $a=6$
 $6x^2 - 3x - 2 = 0$ $b=-3$
 $c=-2$

$$\begin{aligned} x &= \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \\ &= \frac{-(-3) \pm \sqrt{(-3)^2 - 4(6)(-2)}}{2(6)} \\ &= \frac{3 \pm \sqrt{9 + 48}}{12} = \frac{3 \pm \sqrt{57}}{12} \end{aligned}$$

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

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

$$\begin{aligned} x &= -\frac{3}{2} & x &= \frac{4}{3} \\ 2x &= -3 & 3x &= 4 \end{aligned}$$

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

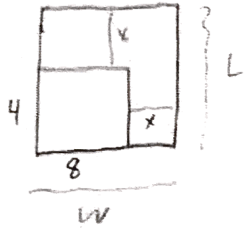
$$6x^2 + 8x + 9x - 12 = 0$$

$$6x^2 + 17x - 12 = 0$$

ANSWER: $6x^2 + 17x - 12 = 0$

9

- 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).



$$\frac{12}{2} = 6$$

$$\left(\frac{12}{2}\right)^2 = 36$$

$$A_{\text{NEW}} = 3 A_{\text{OLD}}$$

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

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

$$(x^2 + 12x + 36 - 36) = 64$$

$$(x^2 + 12x + 36) - 36 = 64$$

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

$$(x+6)^2 = 100$$

$$x+6 = \pm 10$$

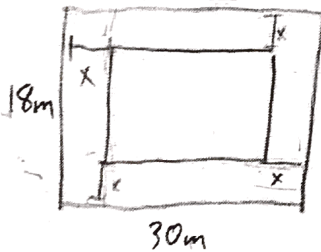
$$x = -6 \pm 10 = -16 \text{ OR } 4$$

$$x = 4$$

SENTENCE ANSWER:

You must add 4.0m 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).



$$30 - 2(1.8267) = 26.3466$$

$$18 - 2(1.8267) = 14.3466$$

$$A_{\text{NEW}} = 0.7 A_{\text{OLD}}$$

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

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

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

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

$$2x^2 - 48x + 81 = 0$$

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

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

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

$$= \frac{48 \pm 40.693}{4}$$

$$= 22.173 \text{ OR } 1.8267$$

SENTENCE ANSWER:

THE NEW LENGTH IS 26.35m
AND THE NEW WIDTH IS 14.35m