

Multiple Choice Solutions

1. $6x^2 - 7x + 2 = 0$ *Use method of choice.

$$a=6, b=-7, c=2$$

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

$$x = \frac{7 \pm \sqrt{(-7)^2 - 4(6)(2)}}{2(6)}$$

$$x = \frac{7 \pm \sqrt{49 - 48}}{12}$$

$$x = \frac{7 \pm \sqrt{1}}{12}$$

$$x = \frac{7 \pm 1}{12}$$

$$x = \frac{7+1}{12}$$

$$x = \frac{8}{12}$$

$$x = \frac{2}{3}$$

$$x = \frac{7-1}{12}$$

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

$$x = \frac{1}{2}$$

2. $\frac{-10 \pm \sqrt{50}}{5}$

$$= \frac{-10 \pm \sqrt{25 \times 2}}{5}$$

$$= \frac{-10 \pm 5\sqrt{2}}{5}$$

$$= -2 \pm \sqrt{2} \quad \text{D}$$

C

$$3. x^2 + x - 6 = 0 \quad a=1, b=1, c=-6$$

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

$$x = \frac{-1 \pm \sqrt{(1)^2 - 4(1)(-6)}}{2(1)} \quad \text{Error in Step 1. A}$$

$$4. M = -3t^2 + 9t$$

$$0 = -3t(t-3)$$

$$\text{Either: } \frac{-3t}{-3} = 0 \quad \text{or} \quad t-3=0$$

$$t=0$$

$$t=3$$

B

$$5. 3x^2 - 2x + 5 = 0 \quad a=3, b=-2, c=5$$

$$D = b^2 - 4ac$$

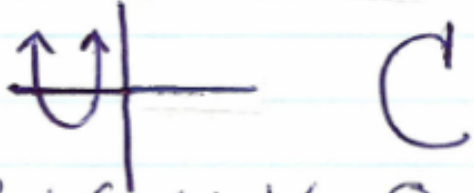
$$= (-2)^2 - 4(3)(5)$$

$$= 4 - 60$$

$$= -56$$

C

6. Positive Discriminant \Rightarrow 2 x -intercepts



7. $x^2 + 6x + K = 0$ $a=1, b=6, c=K$

$$D = b^2 - 4ac$$

$$D = (6)^2 - 4(1)(K)$$

* $D = 36 - 4K$ * 1 Real Root $\Rightarrow D = 0$
* $0 = 36 - 4K$

$$\frac{4K}{4} = \frac{36}{4}$$

$$K = 9 \quad A$$

8. 1 x-intercept \Rightarrow One real root. B

9. $y = x^2 - 16$

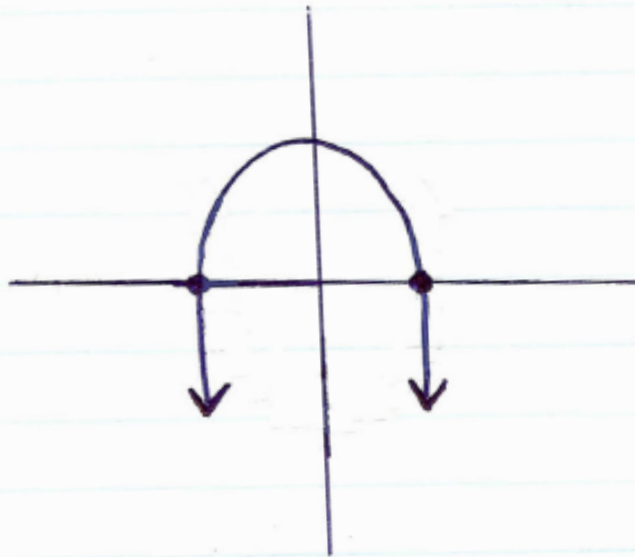
$$\begin{aligned} \hookrightarrow 0 &= x^2 - 16 \\ 16 &= x^2 \\ \pm \sqrt{16} &= x \\ \pm 4 &= x \quad \text{B.} \end{aligned}$$

10. $\sqrt{-28}$
 $= \sqrt{28i^2}$
 $= i\sqrt{4 \times 7}$
 $= 2i\sqrt{7} \quad \text{C}$

SOLUTIONS \Rightarrow QUADRATICS #3 REVIEW

1. QUADRATIC FUNCTION
 \hookrightarrow maximum value & 2 real roots.

Example Solution:



2. Factoring

a) $x^2 + 9x = 0$
 $x(x+9) = 0$

Either: $x=0$ or $x+9=0$
 $x=-9$

b) $5x^2 - 20x = 0$
 $5x(x-4) = 0$

Either: $\frac{5x}{5} = 0$ or $x-4=0$
 $x=0$ $x=4$

c) $x^2 + x = 0$
 $x(x+1) = 0$

Either: $x=0$ or $x+1=0$
 $x=-1$

d) $x^2 - 4x - 12 = 0$
 $(x+2)(x-6) = 0$

Either: $x+2=0$ or $x-6=0$
 $x=-2$ $x=6$

e) $x^2 + 29x + 100 = 0$
 $(x+25)(x+4) = 0$

Either: $x+25=0$ or $x+4=0$
 $x=-25$ $x=-4$

f) $x^2 - 13x + 42 = 0$
 $(x-6)(x-7) = 0$

Either: $x-6=0$ or $x-7=0$
 $x=6$ $x=7$

$$\begin{array}{rcll}
 \text{g) } 2x^2 - 9x - 5 = 0 & & & \\
 (2x^2 + 1x - 10x - 5) = 0 & \text{Mult.} & \text{Add} & \begin{array}{r} -10 \\ \hline 1x - 10 \\ -1x + 10 \\ \hline 2x - 5 \\ -2x + 5 \\ \hline 0 \end{array} \\
 x(2x+1) - 5(2x+1) = 0 & -10 & -9 & \\
 (2x+1)(x-5) = 0 & & &
 \end{array}$$

Either: $2x+1=0$ or $x-5=0$

$$\begin{array}{r}
 2x = -1 \\
 \hline
 2 \quad 2 \\
 x = -\frac{1}{2}
 \end{array}
 \qquad
 \begin{array}{r}
 x = 5
 \end{array}$$

$$\begin{array}{rcll}
 \text{h) } 7x^2 + 33x - 10 = 0 & & & \\
 (7x^2 + 35x - 2x - 10) = 0 & \text{Mult.} & \text{Add} & \begin{array}{r} -70 \\ 1x - 70 \\ -1x + 70 \\ \hline 2x - 35 \\ -2x + 35 \\ \hline 5x - 14 \\ -5x + 14 \\ \hline 7x - 10 \\ -7x + 10 \\ \hline 0 \end{array} \\
 7x(x+5) - 2(x+5) = 0 & -70 & 33 & \\
 (x+5)(7x-2) = 0 & & &
 \end{array}$$

Either: $x+5=0$ or $7x-2=0$

$$\begin{array}{r}
 x = -5 \\
 \hline
 7x = 2 \\
 \hline
 7 \quad 7 \\
 x = \frac{2}{7}
 \end{array}$$

$$i) 12x^2 - 17x - 5 = 0 \quad \text{Mult.} \quad \text{Add}$$

$$(12x^2 + 3x)(-20x - 5) = 0 \quad -60 \quad -17$$

$$3x(4x+1) - 5(4x+1) = 0$$

$$(4x+1)(3x-5) = 0$$

Either: $4x+1=0$ or $3x-5=0$

$$\frac{4x}{4} = \frac{-1}{4}$$

$$x = \frac{-1}{4}$$

$$\frac{3x}{3} = \frac{5}{3}$$

$$x = \frac{5}{3}$$

$$-60$$

$$1x - 60$$

$$-1x + 60$$

$$2x - 30$$

$$-2x + 30$$

$$\boxed{3x - 20}$$

$$-3x + 20$$

$$4x - 15$$

$$-4x + 15$$

$$5x - 12$$

$$-5x + 12$$

$$6x - 10$$

$$-6x + 10$$

$$j) x^2 - 4 = 0 \quad (\text{Difference of Squares})$$

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

$$\text{Either: } x-2=0 \text{ or } x+2=0$$

$$x=2$$

$$x=-2$$

$$k) 4x^2 - 25 = 0$$

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

$$\text{Either: } 2x-5=0 \text{ or } 2x+5=0$$

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

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

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

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

3. Completing the Square

a) $x^2 + 12x + 35 = 0$

$$x^2 + 12x = -35$$

$$x^2 + 12x + 36 = -35 + 36$$

$$(x+6)^2 = 1$$

$$x+6 = \pm\sqrt{1}$$

$$x = -6 \pm \sqrt{1}$$

$$x = -6 \pm 1$$

$$x = -6 + 1$$

$$x = -5$$

$$x = -6 - 1$$

$$x = -7$$

$$b) 3x^2 + 2x - 1 = 0$$

$$\frac{3x^2 + 2x}{3} = \frac{1}{3}$$

$$x^2 + \frac{2}{3}x = \frac{1}{3}$$

$$x^2 + \frac{2}{3}x + \frac{4}{36} = \frac{1}{3} + \frac{4}{36}$$

$$x^2 + \frac{2}{3}x + \frac{1}{9} = \frac{1}{3} + \frac{1}{9} \quad (\text{lowest terms!})$$

$$x^2 + \frac{2}{3}x + \frac{1}{9} = \frac{3}{9} + \frac{1}{9}$$

$$\left(x + \frac{1}{3}\right)^2 = \frac{4}{9}$$

$$x + \frac{1}{3} = \pm \sqrt{\frac{4}{9}}$$

$$x = -\frac{1}{3} \pm \sqrt{\frac{4}{9}}$$

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

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

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

$$x = \frac{1}{3}$$

$$x = -\frac{3}{3} = -1$$

$$d) 2x^2 - 5x - 3 = 0$$

$$\frac{2x^2 - 5x}{2} = \frac{3}{2}$$

$$x^2 - \frac{5}{2}x = \frac{3}{2}$$

$$x^2 - \frac{5}{2}x + \frac{25}{16} = \frac{3}{2} + \frac{25}{16}$$

$$x^2 - \frac{5}{2}x + \frac{25}{16} = \frac{24}{16} + \frac{25}{16}$$

$$\left(x - \frac{5}{4}\right)^2 = \frac{49}{16}$$

$$x - \frac{5}{4} = \pm \sqrt{\frac{49}{16}}$$

$$x = \frac{5}{4} \pm \sqrt{\frac{49}{16}}$$

$$x = \frac{5}{4} \pm \frac{7}{4}$$

$$x = \frac{5}{4} + \frac{7}{4} \quad x = \frac{5}{4} - \frac{7}{4}$$

$$x = \frac{12}{4} \quad x = \frac{-2}{4}$$

$$x = 3 \quad x = \frac{-1}{2}$$

$$d) 5x^2 - 7x - 9 = 0$$

$$\frac{5x^2 - 7x}{5} = \frac{9}{5}$$

$$x^2 - \frac{7x}{5} = \frac{9}{5}$$

$$x^2 - \frac{7x}{5} + \frac{49}{100} = \frac{9}{5} + \frac{49}{100}$$

$$x^2 - \frac{7x}{5} + \frac{49}{100} = \frac{180}{100} + \frac{49}{100}$$

$$\left(x - \frac{7}{10}\right)^2 = \frac{229}{100}$$

$$x - \frac{7}{10} = \pm \sqrt{\frac{229}{100}}$$

$$x = \frac{7}{10} \pm \sqrt{\frac{229}{100}}$$

$$x = \frac{7}{10} \pm \frac{\sqrt{229}}{10}$$

$$e) 2x^2 + 6x - 17 = 0$$

$$\frac{2x^2 + 6x}{2} = \frac{17}{2}$$

$$x^2 + 3x = \frac{17}{2}$$

$$x^2 + 3x + \frac{9}{4} = \frac{17}{2} + \frac{9}{4}$$

$$x^2 + 3x + \frac{9}{4} = \frac{34}{4} + \frac{9}{4}$$

$$\left(x + \frac{3}{2}\right)^2 = \frac{43}{4}$$

$$x + \frac{3}{2} = \pm \sqrt{\frac{43}{4}}$$

$$x = -\frac{3}{2} \pm \sqrt{\frac{43}{4}}$$

$$x = -\frac{3}{2} \pm \frac{\sqrt{43}}{2} \quad \text{or} \quad x = \frac{-3 \pm \sqrt{43}}{2}$$

$$f) x^2 - 5x - 7 = 0$$

$$x^2 - 5x = 7$$

$$x^2 - 5x + \frac{25}{4} = 7 + \frac{25}{4}$$

$$x^2 - 5x + \frac{25}{4} = \frac{28}{4} + \frac{25}{4}$$

$$\left(x - \frac{5}{2}\right)^2 = \frac{53}{4}$$

$$x - \frac{5}{2} = \pm \sqrt{\frac{53}{4}}$$

$$x = \frac{5}{2} \pm \sqrt{\frac{53}{4}}$$

$$x = \frac{5}{2} \pm \frac{\sqrt{53}}{2} \quad \text{or} \quad x = \frac{5 \pm \sqrt{53}}{2}$$

4. Quadratic Formula

$$a) x^2 + 4x + 6 = 0 \quad a=1, b=4, c=6$$

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

$$x = \frac{-4 \pm \sqrt{(4)^2 - 4(1)(6)}}{2(1)}$$

$$x = \frac{-4 \pm \sqrt{16 - 24}}{2}$$

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

$$x = \frac{-4 \pm \sqrt{8i^2}}{2}$$

$$x = \frac{-4 \pm 2i\sqrt{2}}{2}$$

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

$$\begin{aligned} * \sqrt{8} &= \sqrt{4 \times 2} \\ &= 2\sqrt{2} \end{aligned}$$

$$b) 2x^2 - 3x + 2 = 0 \quad a=2, b=-3, c=2$$

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

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

$$x = \frac{3 \pm \sqrt{9 - 16}}{4}$$

$$x = \frac{3 \pm \sqrt{-7}}{4}$$

$$x = \frac{3 \pm \sqrt{7i^2}}{4}$$

$$x = \frac{3 \pm i\sqrt{7}}{4}$$

$$c) \quad x^2 + 8x + 20 = 0 \quad a=1, b=8, c=20$$

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

$$x = \frac{-8 \pm \sqrt{(8)^2 - 4(1)(20)}}{2(1)}$$

$$x = \frac{-8 \pm \sqrt{64 - 80}}{2}$$

$$x = \frac{-8 \pm \sqrt{-16}}{2}$$

$$x = \frac{-8 \pm \sqrt{16i^2}}{2}$$

$$x = \frac{-8 \pm 4i}{2}$$

$$x = -4 \pm 2i$$

$$d) 3x^2 - 4x + 3 = 0 \quad a = 3, b = -4, c = 3$$

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

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

$$x = \frac{4 \pm \sqrt{16 - 36}}{6}$$

$$x = \frac{4 \pm \sqrt{-20}}{6}$$

$$x = \frac{4 \pm \sqrt{20i^2}}{6}$$

$$x = \frac{4 \pm 2i\sqrt{5}}{6}$$

$$x = \frac{2 \pm i\sqrt{5}}{3}$$

$$\begin{aligned} * \sqrt{20} \\ &= \sqrt{4 \times 5} \\ &= 2\sqrt{5} \end{aligned}$$

$$e) 20x^2 - 11x - 3 = 0 \quad a=20, b=-11, c=-3$$

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

$$x = \frac{11 \pm \sqrt{(-11)^2 - 4(20)(-3)}}{2(20)}$$

$$x = \frac{11 \pm \sqrt{121 + 240}}{40}$$

$$x = \frac{11 \pm \sqrt{361}}{40}$$

$$x = \frac{11 \pm 19}{40}$$

$$x = \frac{11 + 19}{40}$$

$$x = \frac{11 - 19}{40}$$

$$x = \frac{30}{40}$$

$$x = \frac{-8}{40}$$

$$x = \frac{3}{4}$$

$$x = -\frac{1}{5}$$

$$f) x^2 + 4x - 6 = 0 \quad a=1, b=4, c=-6$$

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

$$x = \frac{-4 \pm \sqrt{(4)^2 - 4(1)(-6)}}{2(1)}$$

$$x = \frac{-4 \pm \sqrt{16 + 24}}{2}$$

$$x = \frac{-4 \pm \sqrt{40}}{2}$$

$$x = \frac{-4 \pm 2\sqrt{10}}{2}$$

$$x = -2 \pm \sqrt{10}$$

$$\begin{aligned} * \sqrt{40} \\ &= \sqrt{4 \times 10} \\ &= 2\sqrt{10} \end{aligned}$$