

$$11) 8r^2 + 3r + 2 = 7r^2$$

$$r^2 + 3r + 2 = 0$$

$$(r+2)(r+1) = 0$$

$$r+2=0 \quad r+1=0$$

$$r=-2 \quad r=-1$$

$$r = -1, -2$$

$$12) b^2 + b = 2$$

$$b^2 + b - 2 = 0$$

$$(b+2)(b-1) = 0$$

$$b+2=0 \quad b-1=0$$

$$b=-2 \quad b=1$$

$$b = -2, 1$$

$$13) 10n^2 - 35 = 65n$$

$$10n^2 - 65n - 35 = 0$$

$$5(2n^2 - 13n - 7) = 0$$

$$5(2n+1)(n-7) = 0$$

$$2n+1=0 \quad n-7=0$$

$$2n=-1 \quad n=7$$

$$n=-1/2$$

$$n = -1/2, 7$$

$$14) 3x^2 - 8x = 16$$

$$3x^2 - 8x - 16 = 0$$

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

$$3x+4=0 \quad x-4=0$$

$$3x=-4 \quad x=4$$

$$x=-4/3$$

$$x = -4/3, 4$$

$$15) 16n^2 - 114n = -14$$

$$16n^2 - 114n + 14 = 0$$

$$2(8n^2 - 57n + 7) = 0$$

$$2(8n-1)(n-7) = 0$$

$$8n-1=0 \quad n-7=0$$

$$8n=1 \quad n=7$$

$$n=1/8$$

$$n = 1/8, 7$$

$$16) 28n^2 = 96 + 184n$$

$$28n^2 + 184n + 96 = 0$$

$$4(7n^2 + 46n + 24) = 0$$

$$4(7n+4)(n+6) = 0$$

$$7n+4=0 \quad n+6=0$$

$$7n=-4 \quad n=-6$$

$$n=-4/7$$

$$n = 4/7, -6$$

$$17) 7a^2 + 32 = 7 - 40a$$

$$7a^2 + 40a + 25 = 0$$

$$(7a+5)(a+5) = 0$$

$$7a+5=0 \quad a+5=0$$

$$7a=-5 \quad a=-5$$

$$a=-5/7$$

$$a = -5/7, -5$$

$$18) 42x^2 - 69x + 20 = 7x^2 - 8$$

$$35x^2 - 69x + 28 = 0$$

$$(7x-4)(5x-7) = 0$$

$$7x-4=0 \quad 5x-7=0$$

$$7x=4 \quad 5x=7$$

$$x=4/7 \quad x=7/5$$

$$a = 4/7, 7/4$$

Critical thinking questions. True/False.



19) If a quadratic equation can be factored and each factor contains only real numbers then there cannot be an imaginary solution.

TRUE



20) If a quadratic equation cannot be factored then it will have at least one imaginary solution.

FALSE

Solve the equation.

1. $(x+8)(x+6)=0$

$$\begin{array}{l} \downarrow \quad \downarrow \\ x+8=0 \quad x+6=0 \\ x=-8 \quad x=-6 \end{array}$$

$x = -6, -8$

6. $x^2+7x-18=0$

$$(x+9)(x-2)=0$$

$$\begin{array}{l} \downarrow \quad \downarrow \\ x+9=0 \quad x-2=0 \\ x=-9 \quad x=2 \end{array}$$

$x = 2, 9$

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

$$\begin{array}{l} \downarrow \quad \downarrow \\ x=0 \quad x-5=0 \\ x=5 \end{array}$$

$x = 0, 5$

7. $x^2+11x+18=0$

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

$$\begin{array}{l} \downarrow \quad \downarrow \\ x+9=0 \quad x+2=0 \\ x=-9 \quad x=-2 \end{array}$$

$x = -2, -9$

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

$$\begin{array}{l} \downarrow \quad \downarrow \\ 2x+5=0 \quad x-3=0 \\ 2x=-5 \quad x=3 \\ x=-5/2 \end{array}$$

$x = -5/2, 3$

8. $x^2-49=0$

$$(x+7)(x-7)=0$$

$$\begin{array}{l} \downarrow \quad \downarrow \\ x+7=0 \quad x-7=0 \\ x=-7 \quad x=7 \end{array}$$

$x = \pm 7$

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

$$\begin{array}{l} \downarrow \quad \downarrow \\ 2x=0 \quad 3x-2=0 \\ x=0 \quad 3x=2 \\ x=2/3 \end{array}$$

$x = 0, 2/3$

9. $2x^2-2x-4=0$

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

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

$$\begin{array}{l} \downarrow \quad \downarrow \\ x-2=0 \quad x+1=0 \\ x=2 \quad x=-1 \end{array}$$

$x = -1, 2$

5. $\left(\frac{1}{3}-3x\right)\left(\frac{1}{5}+2x\right)=0$

$$\begin{array}{l} \downarrow \quad \downarrow \\ \frac{1}{3}-3x=0 \quad \frac{1}{5}+2x=0 \\ \frac{1}{3}=3x \quad 2x=-1/5 \\ x=1/9 \quad x=-1/10 \end{array}$$

$x = 1/9, -1/10$

10. $x^2+10x+25=0$

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

$$\begin{array}{l} \downarrow \quad \downarrow \\ x+5=0 \quad x+5=0 \\ x=-5 \quad x=-5 \end{array}$$

$x = -5$