Exercise

Solve: $x^2 = -25$

Solution

$$x = \pm\sqrt{-25}$$
$$= \pm 5i$$

Exercise

Solve: $x^2 = 49$

Solution

$$x = \pm 7$$

Exercise

Solve: $9x^2 = 100$

Solution

$$x^2 = \frac{100}{9}$$
$$x = \pm\sqrt{\frac{100}{9}}$$
$$= \pm\frac{10}{3}$$

Exercise

Solve: $4x^2 + 25 = 0$

Solution

$$4x^2 = -25$$
$$x^2 = -\frac{25}{4}$$
$$x = \pm\sqrt{-\frac{25}{4}}$$
$$= \pm\frac{5}{2}i$$

Exercise

Solve: $5x^2 + 35 = 0$

Solution

$5x^2 = -35$

$x^2 = -7$

$x = \pm i\sqrt{7}$

Exercise

Solve: $5x^2 - 45 = 0$

Solution

$5x^2 = 45$

$x = \frac{45}{5}$

$x^2 = 9$

$x = \pm 3$

Exercise

Solve: $(x-4)^2 = 12$

Solution

$x - 4 = \pm\sqrt{12}$

$x = 4 \pm \sqrt{12}$ $\qquad \sqrt{12} = \sqrt{4(3)} = 2\sqrt{3}$

$x = 4 \pm 2\sqrt{3}$

Exercise

Solve: $(x+3)^2 = -16$

Solution

$x + 3 = \pm\sqrt{-16}$

$x = -3 \pm 4i$

Exercise

Solve: $(x-2)^2 = -20$

Solution

$$x - 2 = \pm\sqrt{-20}$$

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

Exercise

Solve: $(4x+1)^2 = 20$

Solution

$$4x + 1 = \pm\sqrt{20}$$

$$4x = -1 \pm 2\sqrt{5}$$

$$\underline{x = \frac{-1 \pm 2\sqrt{5}}{4}}$$

Exercise

Solve $x^2 - 6x = -7$

Solution

$$x = \frac{-(-6) \pm \sqrt{(-6)^2 - 4(1)(7)}}{2(1)} \qquad x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{6 \pm \sqrt{8}}{2}$$

$$= \frac{6 \pm 2\sqrt{2}}{2}$$

$$= \frac{2\left(3 \pm \sqrt{2}\right)}{2}$$

$$\underline{= 3 \pm \sqrt{2}}$$

Exercise

Solve $-6x^2 = 3x + 2$

Solution

$$6x^2 + 3x + 2 = 0$$

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

$$= \frac{-3 \pm \sqrt{-39}}{12}$$

$$= \frac{-3}{12} \pm i\frac{\sqrt{39}}{12}$$

$$\underline{= -\frac{1}{4} \pm i\frac{\sqrt{39}}{12}}$$

Exercise

Solve: $3x^2 + 2x = 7$

Solution

$$3x^2 + 2x - 7 = 0 \qquad \Rightarrow \text{ a = 3, b = 2, c = - 7}$$

$$x = \frac{-2 \pm \sqrt{4 - 4(3)(-7)}}{2(3)} \qquad x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{-2 \pm \sqrt{88}}{6}$$

$$= \frac{-2 \pm \sqrt{4(22)}}{6}$$

$$= \frac{-2 \pm 2\sqrt{22}}{6}$$

$$= \frac{2\left(-1 \pm \sqrt{22}\right)}{6}$$

$$\underline{= \frac{-1 \pm \sqrt{22}}{3}} \qquad x = -\frac{1}{3} \pm \frac{\sqrt{22}}{3}$$

Exercise

$3x^2 + 6 = 10x$

Solution

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

$$x = \frac{-(-10) \pm \sqrt{(-10)^2 - 4(3)(6)}}{2(3)} \qquad x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{10 \pm \sqrt{100 - 72}}{6}$$

$$= \frac{10}{6} \pm \frac{\sqrt{28}}{6}$$

$$= \frac{5}{3} \pm \frac{2\sqrt{7}}{6}$$

$$\underline{= \frac{5}{3} \pm \frac{\sqrt{7}}{3}}$$

Exercise

Solve: $5x^2 + 2 = x$

Solution

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

$$x = \frac{1 \pm \sqrt{1 - 40}}{10} \qquad x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{1 \pm \sqrt{-39}}{10}$$

$$= \frac{1 \pm i\sqrt{39}}{10}$$

$$\underline{= \frac{1}{10} \pm i\frac{\sqrt{39}}{10}}$$

Exercise

Solve: $5x^2 = 2x - 3$

Solution

$$5x^2 - 2x + 3 = 0$$

$$x = \frac{-(-2) \pm \sqrt{(-2)^2 - 4(5)(3)}}{2(5)} \qquad x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{2 \pm \sqrt{4 - 60}}{10}$$

$$= \frac{2 \pm \sqrt{-56}}{10}$$

$$= \frac{2 \pm i\sqrt{4(14)}}{10}$$

$$= \frac{2 \pm i2\sqrt{14}}{10}$$

$$= \frac{2}{10} \pm i\frac{2\sqrt{14}}{10}$$

$$= \underline{\left| \frac{1}{5} \pm i\frac{\sqrt{14}}{5} \right|}$$

Exercise

Solve: $x^2 + 8x + 15 = 0$

Solution

$$x = \frac{-8 \pm \sqrt{8^2 - 4(1)(15)}}{2(1)} \qquad x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{-8 \pm \sqrt{64 - 60}}{2}$$

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

$$= \frac{-8 \pm 2}{2}$$

$$= \begin{cases} \underline{\left| \frac{-8+2}{2} = \frac{-6}{2} = -3 \right|} \\ \underline{\left| \frac{-8-2}{2} = \frac{-10}{2} = -5 \right|} \end{cases}$$

Exercise

Solve: $x^2 + 5x + 2 = 0$

Solution

$$x = \frac{-5 \pm \sqrt{5^2 - 4(1)(2)}}{2(1)} \qquad x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{-5 \pm \sqrt{25 - 8}}{2}$$

$$= \frac{-5 \pm \sqrt{17}}{2}$$

$$= \underline{\left| \frac{-5}{2} \pm \frac{\sqrt{17}}{2} \right|}$$

Exercise

Solve: $x^2 + x - 12 = 0$

Solution

$$x = \frac{-1 \pm \sqrt{1+48}}{2} \qquad x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{-1 \pm 7}{2}$$

$$= \begin{cases} \frac{-1-7}{2} = -4 \\ \frac{-1+7}{2} = 3 \end{cases}$$

Exercise

Solve: $x^2 - 2x - 15 = 0$

Solution

$$x = \frac{2 \pm \sqrt{4+60}}{2} \qquad x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{2 \pm 8}{2}$$

$$= \begin{cases} \frac{2+8}{2} = 5 \\ \frac{2-8}{2} = -3 \end{cases}$$

Exercise

Solve: $x^2 - 4x - 45 = 0$

Solution

$$x = \frac{4 \pm \sqrt{16+180}}{2} \qquad x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{4 \pm \sqrt{196}}{2}$$

$$= \frac{4 \pm 14}{2}$$

$$= \begin{cases} \frac{4+14}{2} = 9 \\ \frac{4-14}{2} = -5 \end{cases}$$

Exercise

Solve: $x^2 - 6x - 10 = 0$

Solution

$$x^2 - 6x = 10$$

$$x^2 - 6x + \left(\frac{-6}{2}\right)^2 = 10 + \left(\frac{-6}{2}\right)^2$$

$$x^2 - 2(3)x + (3)^2 = 10 + 9$$

$$(x-3)^2 = 19$$

$$x - 3 = \pm\sqrt{19}$$

$$\underline{x = 3 \pm \sqrt{19}}$$

Exercise

Solve: $2x^2 + 3x - 4 = 0$

Solution

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

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

$$x^2 + \frac{3}{2}x + \left(\frac{3}{4}\right)^2 = 2 + \frac{9}{16}$$

$$\left(x + \frac{3}{4}\right)^2 = \frac{41}{16}$$

$$x + \frac{3}{4} = \pm\sqrt{\frac{41}{16}}$$

$$\underline{x = -\frac{3}{4} \pm \frac{\sqrt{41}}{4}}$$

Exercise

Solve $x^2 - x + 8 = 0$

Solution

$$x = \frac{1 \pm \sqrt{1 - 32}}{2}$$

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

$$= \frac{1 \pm \sqrt{-31}}{2}$$

$$= \boxed{\frac{1 \pm i\sqrt{31}}{2}}$$

Exercise

Solve $2x^2 - 13x = 1$

Solution

$$2x^2 - 13x - 1 = 0$$

$$x = \frac{13 \pm \sqrt{169 + 8}}{4} \qquad x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{13 \pm \sqrt{169 + 8}}{4}$$

$$= \boxed{\frac{13 \pm \sqrt{177}}{4}}$$

Exercise

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

Solution

$$r = \frac{-3 \pm \sqrt{3^2 - 4(1)(-3)}}{2(1)} \qquad x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{-3 \pm \sqrt{9 + 12}}{2}$$

$$= \boxed{\frac{-3 \pm \sqrt{21}}{2}}$$

Exercise

Solve: $x^3 + 8 = 0$

Solution

$$(x + 2)\left(x^2 - 2x + 4\right) = 0 \qquad a^3 + b^3 = (a + b)\left(a^2 - ab + b^2\right)$$

$$x + 2 = 0 \qquad x^2 - 2x + 4 = 0$$

$x = -2$

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

$$= \frac{2 \pm \sqrt{-12}}{2}$$

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

$$= \frac{2\left(1 \pm i\sqrt{3}\right)}{2}$$

$$\underline{= 1 \pm i\sqrt{3}}$$

The solution set is $\left\{-2,\ 1 \pm i\sqrt{3}\right\}$

Exercise

Solve: $4x^2 - 12x + 9 = 0$

Solution

$$x = \frac{12 \pm \sqrt{144 - 144}}{8} \qquad x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

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

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

Exercise

Solve: $9x^2 - 30x + 25 = 0$

Solution

$$x = \frac{30 \pm \sqrt{900 - 900}}{18} \qquad x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{30}{18}$$

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

Exercise

Solve: $x^2 - 14x + 49 = 0$

Solution

$$x = \frac{14 \pm \sqrt{196 - 196}}{2} \qquad x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{14}{2}$$

$$= 7$$

Exercise

Solve: $x^2 - 8x + 16 = 0$

Solution

$$x = \frac{8 \pm \sqrt{64 - 64}}{2} \qquad x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{8}{2}$$

$$= 4$$

Exercise

Solve: $x^2 + 6x + 13 = 0$

Solution

$$x = \frac{-6 \pm \sqrt{36 - 52}}{2} \qquad x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{-6 \pm \sqrt{-16}}{2}$$

$$= \frac{-6 \pm 4i}{2}$$

$$= -3 \pm 2i$$

Exercise

Solve: $2x^2 - 2x + 13 = 0$

Solution

$$x = \frac{2 \pm \sqrt{4 - 104}}{4} \qquad x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{2 \pm \sqrt{-100}}{4}$$

$$= \frac{2 \pm 10i}{4}$$

$$= \underline{\left| \frac{1}{2} \pm \frac{5}{2} i \right|}$$

Exercise

Solve: $x^2 + 2x + 29 = 0$

Solution

$$x = \frac{-2 \pm \sqrt{4 - 116}}{2} \qquad x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{-2 \pm \sqrt{-112}}{2}$$

$$= \frac{-2 \pm 4i\sqrt{7}}{2}$$

$$= \underline{\left| -1 \pm 2i\sqrt{7} \right|}$$

Exercise

Solve: $4x^2 + 4x + 13 = 0$

Solution

$$x = \frac{-4 \pm \sqrt{16 - 16(13)}}{8} \qquad x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{-4 \pm 4\sqrt{-12}}{8}$$

$$= \frac{-4 \pm 8i\sqrt{3}}{8}$$

$$= \underline{\left| -\frac{1}{2} \pm i\sqrt{3} \right|}$$

Exercise

Solve: $x^2 - 2x + 26 = 0$

Solution

$$x = \frac{2 \pm \sqrt{4 - 4(26)}}{2} \qquad x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{2 \pm 2\sqrt{-25}}{2}$$

$$= 1 \pm 5i$$

Exercise

Solve: $9x^2 - 4x + 20 = 0$

Solution

$$x = \frac{4 \pm \sqrt{16 - 16(45)}}{18} \qquad x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{4 \pm 4\sqrt{-44}}{18}$$

$$= \frac{-4 \pm 8i\sqrt{11}}{8}$$

$$= -\frac{1}{2} \pm i\sqrt{11}$$

Exercise

Solve: $x^2 + 6x + 21 = 0$

Solution

$$x = \frac{-6 \pm \sqrt{36 - 84}}{2} \qquad x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{-6 \pm \sqrt{-48}}{2}$$

$$= \frac{-6 \pm 4i\sqrt{3}}{2}$$

$$= -3 \pm 2i\sqrt{3}$$

Exercise

Solve: $9x^2 - 12x - 49 = 0$

Solution

$$x = \frac{12 \pm \sqrt{2^4 3^2 - 2^2 3^2 7^2}}{18} \qquad x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{12 \pm 6\sqrt{4-49}}{18}$$

$$= \frac{12 \pm 6\sqrt{-45}}{18}$$

$$= \frac{12 \pm 18i\sqrt{5}}{18}$$

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

Exercise

Solve: $x(x-3) = 18$

Solution

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

$$x = \frac{3 \pm \sqrt{9+72}}{2} \qquad x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{3 \pm 9}{2}$$

$$= \begin{cases} \underline{\frac{3+9}{2} = 6} \\ \underline{\frac{3-9}{2} = -3} \end{cases}$$

Exercise

Solve: $x(x-4) - 21 = 0$

Solution

$$x^2 - 4x - 21 = 0$$

$$x = \frac{4 \pm \sqrt{16+84}}{2} \qquad x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{4 \pm 10}{2}$$

$$= \begin{cases} \underline{\frac{4+10}{2} = 7} \\ \underline{\frac{4-10}{2} = -3} \end{cases}$$

Exercise

Solve: $(x-1)(x+4)=14$

Solution

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

$$x=\frac{-3\pm\sqrt{9+72}}{2} \qquad x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$$

$$=\frac{-3\pm 9}{2}$$

$$=\begin{cases}\frac{-3+9}{2}=3\\ \frac{-3-9}{2}=-6\end{cases}$$

Exercise

Solve: $(x-3)(x+8)=-30$

Solution

$$x^2+5x+6=0$$

$$x=\frac{-5\pm\sqrt{25-24}}{2} \qquad x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$$

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

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

Exercise

Solve: $x(x+8)=16(x-1)$

Solution

$$x^2+8x=16x-16$$

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

$$x=\frac{8\pm\sqrt{64-64}}{2} \qquad x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$$

$$=\frac{8}{2}$$

$$=4$$

Exercise

Solve: $x(x+9)=4(2x+5)$

Solution

$$x^2+9x=8x+20$$
$$x^2+x-20=0$$
$$x=\frac{-1\pm\sqrt{1+80}}{2} \qquad x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$$
$$=\frac{-1\pm 9}{2}$$
$$=\begin{cases}\frac{-1+9}{2}=4\\ \frac{-1-9}{2}=-5\end{cases}$$

Exercise

Solve: $(x+1)^2=2(x+3)$

Solution

$$x^2+2x+1=2x+6$$
$$x^2=5$$
$$x=\pm\sqrt{5}$$

Exercise

Solve: $(x+1)^2-5(x+2)=3x+7$

Solution

$$x^2+2x+1-5x-10=3x+7$$
$$x^2-6x-16=0$$
$$x=\frac{6\pm\sqrt{36+64}}{2} \qquad x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$$
$$=\frac{6\pm 10}{2}$$
$$=\begin{cases}\frac{6+10}{2}=8\\ \frac{6-10}{2}=-2\end{cases}$$

Exercise

Solve: $x(8x+1) = 3x^2 - 2x + 2$

Solution

$$8x^2 + x = 3x^2 - 2x + 2$$

$$5x^2 + 3x - 2 = 0$$

$$x = \frac{-3 \pm \sqrt{9+40}}{10} \qquad x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{-3 \pm 7}{2}$$

$$= \begin{cases} \underline{\dfrac{-3+7}{10} = \dfrac{2}{5}} \\ \underline{\dfrac{-3-7}{10} = -1} \end{cases}$$

Exercise

Solve: $x^2 + 6x - 7 = 0$

Solution

$1 + 6 - 7 = 0 \qquad a + b + c = 0$

$\underline{x = 1, \ -7}$ $\qquad x_1 = 1, \quad x_2 = \dfrac{c}{a}$

Exercise

Solve: $x^2 - 6x - 7 = 0$

Solution

$1 - (-6) - 7 = 0 \qquad a - b + c = 0$

$\underline{x = -1, \ 7}$ $\qquad x_1 = -1, \quad x_2 = -\dfrac{c}{a}$

Exercise

Solve: $3x^2 + 4x - 7 = 0$

Solution

$3 + 4 - 7 = 0 \qquad a + b + c = 0$

$\underline{x = 1, \ -\dfrac{7}{3}}$ $\qquad x_1 = 1, \quad x_2 = \dfrac{c}{a}$

Exercise

Solve: $3x^2 - 4x - 7 = 0$

Solution

$3 - (-4) - 7 = 0 \qquad a - b + c = 0$

$\boxed{x = -1,\ \frac{7}{3}} \qquad x_1 = -1, \quad x_2 = -\frac{c}{a}$

Exercise

Solve: $3x^2 - x - 2 = 0$

Solution

$3 - 1 - 2 = 0 \qquad a + b + c = 0$

$\boxed{x = 1,\ -\frac{2}{3}} \qquad x_1 = 1, \quad x_2 = \frac{c}{a}$

Exercise

Solve: $3x^2 + x - 2 = 0$

Solution

$3 - 1 - 2 = 0 \qquad a - b + c = 0$

$\boxed{x = -1,\ \frac{2}{3}} \qquad x_1 = -1, \quad x_2 = -\frac{c}{a}$

Exercise

Solve: $2x^2 + 3x - 5 = 0$

Solution

$2 + 3 - 5 = 0 \qquad a + b + c = 0$

$\boxed{x = 1,\ -\frac{5}{2}} \qquad x_1 = 1, \quad x_2 = \frac{c}{a}$

Exercise

Solve: $2x^2 - 3x - 5 = 0$

Solution

$2-(-3)-5=0 \qquad a+b+c=0$

$\underline{x=-1,\ \frac{5}{2}\ |} \qquad x_1=-1,\quad x_2=-\frac{c}{a}$

Exercise

Solve: $x^2-3x-4=0$

Solution

$1-(-3)-4=0 \qquad a-b+c=0$

$\underline{x=-1,\ 4\ |} \qquad x_1=-1,\quad x_2=-\frac{c}{a}$

Exercise

Solve: $x^2+3x-4=0$

Solution

$1+3-4=0 \qquad a+b+c=0$

$\underline{x=1,\ -4\ |} \qquad x_1=1,\quad x_2=\frac{c}{a}$

Exercise

Solve: $x^2+2x+1=0$

Solution

$1-2+1=0 \qquad a-b+c=0$

$\underline{x=-1,\ -1\ |} \qquad x_1=-1,\quad x_2=-\frac{c}{a}$

Exercise

Solve: $4x^2-x-5=0$

Solution

$4-(-1)-5=0 \qquad a-b+c=0$

$\underline{x=-1,\ \frac{5}{4}\ |} \qquad x_1=-1,\quad x_2=-\frac{c}{a}$

Exercise

Solve for the specified variable $A = \frac{\pi d^2}{4}, \quad for\ d$

Solution

$$\frac{4}{\pi}A = \frac{4}{\pi}\frac{\pi d^2}{4} \qquad 4A = 4\frac{\pi d^2}{4}$$

$$\frac{4A}{\pi} = d^2 \qquad 4A = \pi d^2$$

$$d^2 = \frac{4A}{\pi} \qquad \frac{4A}{\pi} = \frac{\pi}{\pi}d^2$$

$$d = \pm\sqrt{\frac{4A}{\pi}}$$

$$= \pm 2\frac{\sqrt{A}}{\sqrt{\pi}}$$

$$= \pm 2\frac{\sqrt{A}}{\sqrt{\pi}}\frac{\sqrt{\pi}}{\sqrt{\pi}}$$

$$\boxed{= \pm\frac{2\sqrt{\pi A}}{\pi}}$$

Exercise

Solve for the specified variable $rt^2 - st - k = 0 \quad (r \neq 0), \quad for\ t$

Solution

$$t = \frac{-(-s) \pm \sqrt{(-s)^2 - 4(r)(-k)}}{2(r)} \qquad t = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$\boxed{t = \frac{s \pm \sqrt{s^2 + 4rk}}{2r}}$$