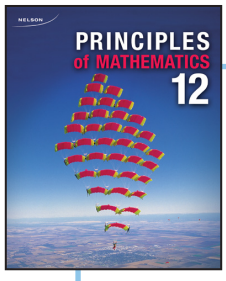


- If you have any difficulty with these solutions, please contact your teacher before continuing.

Page 357, *Your Turn*

a.

Write both sides of the equation as powers of 4.

$$4^{x+5} = 64^{2x}$$
$$4^{x+5} = \left(4^3\right)^{2x}$$
$$4^{x+5} = 4^{6x}$$ ✓
$$x + 5 = 6x$$ ✓
$$5 = 5x$$
$$1 = x$$ ✓

Verify the answer by substituting $x = 1$ into the original equation.

Left Side	Right Side
4^{x+5}	64^{2x}
4^{1+5}	$64^{2(1)}$
4^6	64^2
4096	4096 ✓

Because the left side is equal to the right side, the answer $x = 1$ is verified to be correct.

Page 362, *Question 7*

b. $8(3)^{\frac{x}{2}} = 72$

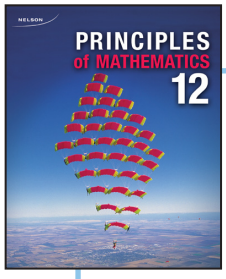
$$(3)^{\frac{x}{2}} = \frac{72}{8}$$
$$(3)^{\frac{x}{2}} = 9$$
$$(3)^{\frac{x}{2}} = 3^2$$ ✓
$$\frac{x}{2} = 2$$ ✓
$$x = 4$$ ✓

e. $4^{1-2x} = 32$

$$\left(2^2\right)^{1-2x} = 2^5$$
$$2^{2-4x} = 2^5$$ ✓
$$2 - 4x = 5$$
$$-4x = 3$$ ✓
$$x = -\frac{3}{4}$$ ✓

f. $10^{2(x-3)} = 1000$

$$10^{2(x-3)} = 10^3$$ ✓
$$2(x-3) = 3$$ ✓
$$2x - 6 = 3$$
$$2x = 9$$
$$x = 4.5$$ ✓



- If you have any difficulty with these solutions, please contact your teacher before continuing.

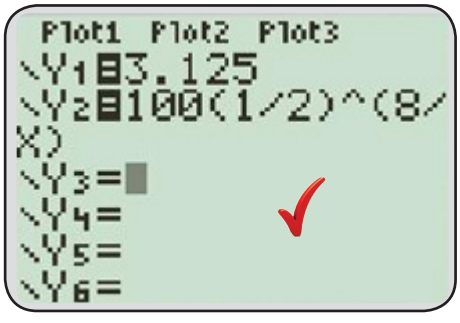
Page 359, *Your Turn*

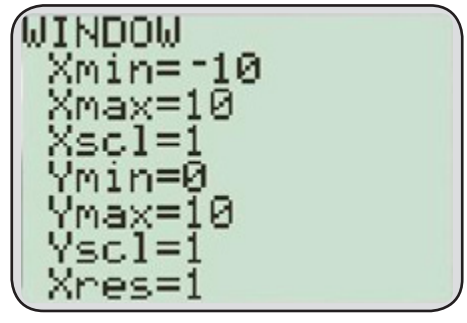
a. Substitute the values $A_0 = 100$, $A(x) = 3.125$, and $x = 8$ into the half-life equation.

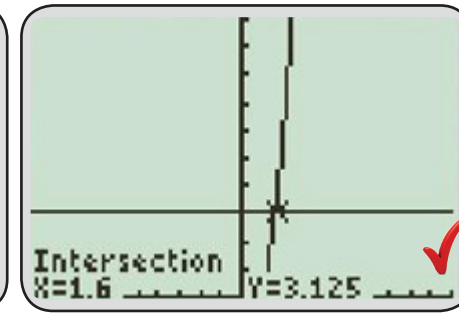
$$A(x) = A_0\left(\frac{1}{2}\right)^{\frac{x}{h}}$$

$$3.125 = 100\left(\frac{1}{2}\right)^{\frac{8}{h}}$$ ✓

Graph the terms on each side of the equation and find the intersection points.

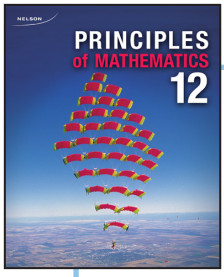






The solution to the equation is the x-value of the intersection point, $x = 1.6$.

When the divers are at 1.6 m below the surface, the visibility will be half the visibility at the surface. ✓



- If you have any difficulty with these solutions, please contact your teacher before continuing.

Page 363, *Question 10*

If the original amount $A_0 = 100$ then, half the original amount means $A(t) = 50$.

a. $A(t) = A_0\left(\frac{1}{2}\right)^{\frac{t}{5.3}}$

$50 = 100\left(\frac{1}{2}\right)^{\frac{t}{5.3}}$ ✓

$\frac{50}{100} = \left(\frac{1}{2}\right)^{\frac{t}{5.3}}$

$\frac{1}{2} = \left(\frac{1}{2}\right)^{\frac{t}{5.3}}$ ✓

$\left(\frac{1}{2}\right)^{1} = \left(\frac{1}{2}\right)^{\frac{t}{5.3}}$

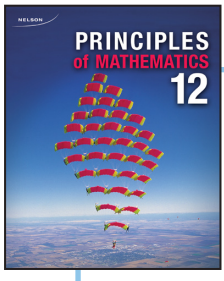
$1 = \frac{t}{5.3}$

$5.3 = t$ ✓

It takes 5.3 years for cobalt-60 to reduce to half its original amount. ✓

b. $A(t) = A_0\left(\frac{1}{2}\right)^{\frac{t}{5.3}} = 100\left(\frac{1}{2}\right)^{\frac{10}{5.3}} \cong 27$ ✓

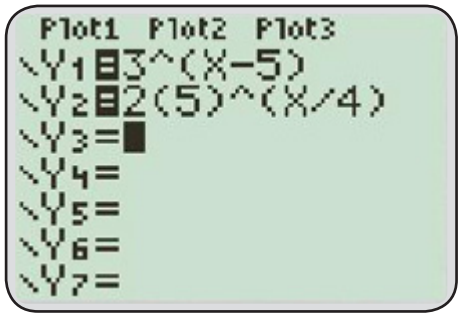
After ten years, approximately 27% of cobalt-60 will remain. ✓

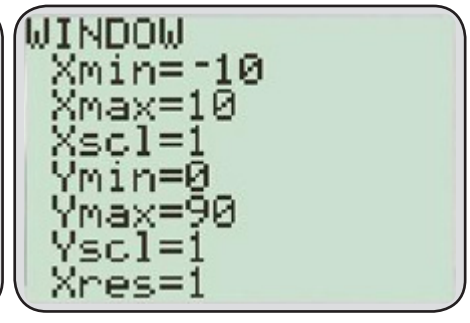


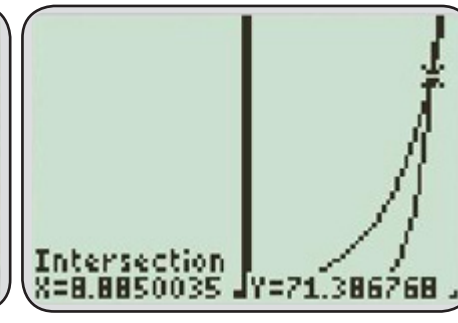
- If you have any difficulty with these solutions, please contact your teacher before continuing.

Page 360, *Your Turn*

a. Graph the terms on each side of the equation and find the intersection points.







The solution to the equation is the x-value of the intersection point, $x \cong 8.885$.

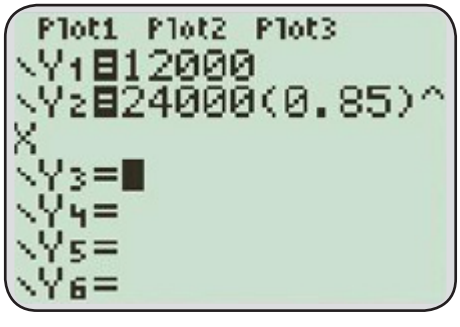
The solution, to one decimal place, is $x = 8.9$.

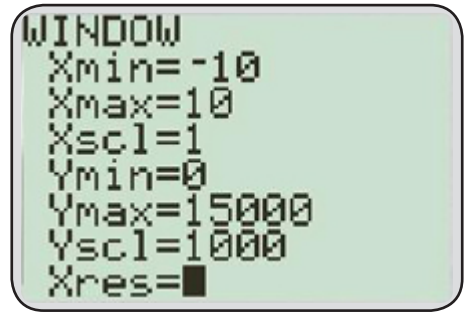
Page 364, *Question 14*

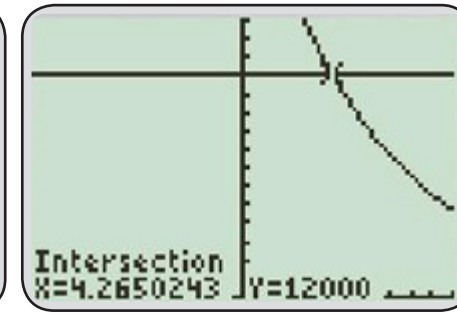
a. Substitute the value $V(t) = 12\,000$ into the equation.

$V(t) = 24\,000(0.85)^t$

$12\,000 = 24\,000(0.85)^t$







The solution to the equation is the x-value of the intersection point, $x \cong 4.265$.

The vehicle will be worth \$12 000 about 4.27 years after the purchase date.