

f) $x \times x \times y \times y \times y \times y \times z \times z \times z \times w = wx^2y^4z^3$

7. a) one million and three hundred thousand $= 1.3 \times 10^6$

b) 2 870 000 000 000 $= 2.87 \times 10^{12}$

c) 36 020 000 $= 3.602 \times 10^7$ d) 58 996 $= 5.8996 \times 10^4$

e) 6 015 $= 6.015 \times 10^3$ f) 240 $= 2.4 \times 10^2$

8. a) $2.376 \times 10^4 = 23\,760$

b) $5.8 \times 10^7 = 58\,000\,000$

c) $9.006 \times 10^8 = 900\,600\,000$

d) $3.191 \times 10^0 = 3.191$

e) $3.6 \times 10^2 = 360$

f) $2.2345 \times 10^5 = 223\,450$

9. a) $(7 - 3)^3 + 1$
 $= (4)^3 + 1$
 $= 64 + 1$
 $= 65$

b) $(3)(3)(3) + (2)^3$
 $= 27 + 8$
 $= 35$

c) $(-4)^3 + (-4)^2$
 $= -64 + 16$
 $= -48$

d) $5^4 \div 5^2$
 $= 625 \div 25$
 $= 25$

e) $(2 \times 3)^2 + (9 \div 3)^3$
 $= (6)^2 + (3)^3$
 $= 36 + 27$
 $= 63$

f) $(-2)^2(-3) + 4^2$
 $= (4)(-3) + 16$
 $= -12 + 16$
 $= 4$

10. a) $x^m \times x^n = x^{m+n}$

b) $x^m \div x^n = x^{m-n}$

c) $(x^m)^n = x^{m \times n}$

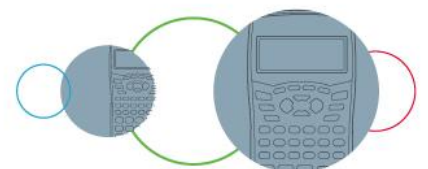
d) $(x^m \times y^n)^p = x^{m \times p} y^{n \times p}$

e) $x^1 = x$

f) $x^0 = 1$

11. a) $a^2 \times a^3 \div a^4$
 $= a^5 \div a^4$
 $= a$

b) $\frac{a^3b}{c^2} \times \frac{(ac)^2}{b^3}$
 $= \frac{a^3b}{c^2} \times \frac{a^2c^2}{b^3}$
 $= \frac{a^5bc^2}{b^3c^2}$
 $= \frac{a^5}{b^2}$



$$\begin{aligned}
 \text{c)} \quad & \frac{a^2bc}{c^3d} \div \frac{a^2b^2}{(cd)^2} \\
 & = \frac{a^2b}{c^2d} \times \frac{c^2d^2}{a^2b^2} \\
 & = \frac{a^2bc^2d^2}{a^2b^2c^2d} \\
 & = \frac{d}{b}
 \end{aligned}$$

$$\begin{aligned}
 \text{d)} \quad & \frac{ef^4}{(gh)^0} \times \frac{(g^0h)^2}{e^3f} \\
 & = \frac{ef^4}{1} \times \frac{h^2}{e^3f} \\
 & = \frac{ef^4h^2}{e^3f} \\
 & = \frac{f^3h^2}{e^2}
 \end{aligned}$$

$$\begin{aligned}
 \text{e)} \quad & \frac{x^3y^2z^3}{(x^4y)^1} \times \frac{x^3y^4}{z^2} \div \frac{x^5y^5}{z^6} \\
 & = \frac{x^3y^2z^3}{x^4y} \times \frac{x^3y^4}{z^2} \times \frac{z^6}{x^5y^5} \\
 & = \frac{x^6y^6z^9}{x^9y^6z^2} \\
 & = \frac{z^7}{x^3}
 \end{aligned}$$

$$\begin{aligned}
 \text{f)} \quad & (x^2 + y^2)^0 \\
 & = 1
 \end{aligned}$$

$$\begin{aligned}
 12. \quad \text{a)} \quad & x^2 = 100 \\
 & x = \sqrt{100} \\
 & x = 10
 \end{aligned}$$

$$\begin{aligned}
 \text{b)} \quad & 9^x = 81 \\
 & 9^x = 9^2 \\
 & x = 2
 \end{aligned}$$

$$\begin{aligned}
 \text{c)} \quad & 11^2 = x \\
 & x = 121
 \end{aligned}$$

$$\begin{aligned}
 \text{d)} \quad & 36 = x^2 \\
 & x = \sqrt{36} \\
 & x = 6
 \end{aligned}$$

$$\begin{aligned}
 \text{e)} \quad & 7^x = 49 \\
 & 7^x = 7^2 \\
 & x = 2
 \end{aligned}$$

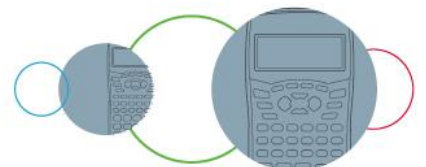
$$\begin{aligned}
 \text{f)} \quad & 29 = x^2 + 4 \\
 & x^2 = 25 \\
 & x = \sqrt{25} \\
 & x = 5
 \end{aligned}$$

$$\begin{aligned}
 \text{g)} \quad & 3^x + 2 = 29 \\
 & 3^x = 27 \\
 & 3^x = 3^3 \\
 & x = 3
 \end{aligned}$$

$$\begin{aligned}
 \text{h)} \quad & 6^3 = x \\
 & x = 216
 \end{aligned}$$

$$\begin{aligned}
 \text{i)} \quad & x = (3 + 4)^2 \\
 & x = 7^2 \\
 & x = 49
 \end{aligned}$$

$$\begin{aligned}
 \text{j)} \quad & (2 + x)^3 = 125 \\
 & 2 + x = \sqrt[3]{125} \\
 & x + 2 = 5 \\
 & x = 3
 \end{aligned}$$



<p>13. a) $\sqrt[3]{0.008}$ $= \sqrt[3]{\frac{8}{1000}}$ $= \frac{2}{10}$ $= 0.2 \text{ or } \frac{1}{5}$</p>	<p>b) $\sqrt[3]{0.064}$ $= \sqrt[3]{\frac{64}{1000}}$ $= \frac{4}{10}$ $= 0.4 \text{ or } \frac{2}{5}$</p>	<p>c) $\sqrt{0.36}$ $= \sqrt{\frac{36}{100}}$ $= \frac{6}{10}$ $= 0.6 \text{ or } \frac{3}{5}$</p>
<p>d) $\sqrt{0.0016}$ $= \sqrt{\frac{16}{10000}}$ $= \frac{4}{100}$ $= 0.04 \text{ or } \frac{1}{25}$</p>	<p>e) $\sqrt[3]{0.125}$ $= \sqrt[3]{\frac{125}{1000}}$ $= \frac{5}{10}$ $= 0.5 \text{ or } \frac{1}{2}$</p>	<p>f) $\sqrt{0.49}$ $= \sqrt{\frac{49}{100}}$ $= \frac{7}{10}$ $= 0.7 \text{ or } \frac{7}{10}$</p>
<p>g) $\sqrt{0.0064}$ $= \sqrt{\frac{64}{10000}}$ $= \frac{8}{100}$ $= 0.08 \text{ or } \frac{2}{25}$</p>	<p>h) $\left(\frac{4}{10}\right)^2$ $= \frac{16}{100}$ $= 0.16 \text{ or } \frac{4}{25}$</p>	<p>i) $\sqrt[3]{\frac{1}{8}}$ $= \frac{1}{2}$ $= 0.5 \text{ or } \frac{1}{2}$</p>
<p>j) $\left(\frac{4}{5}\right)^3$ $= \frac{64}{125} \text{ or } 0.512$</p>	<p>k) $\left(\frac{1}{3}\right)^3$ $= \frac{1}{27}$</p>	<p>l) $\sqrt{\sqrt{16}}$ $= \sqrt{4}$ $= 2$</p>

14. Message: $6 \times 7; 8^2 - 1; 7^2 + 2^2$ $2^2 + 1; 5.3 \times 10; 6^2 + 1; 9 \times 11; 2 \times 5^2 + 3; 7^2 - 7$
 $6^2 + 6; 10^2 - 1; 8^2 - 11; 7^2 + 2; 3^2 - 2^2; 9^2 - 2^3; 9^2 + 4^2 + 2; 106 \div 2$ $9^2 + 10; 2^2 + 1$
 $8^2 - 1; 4^3 + 3^3; 1^2; 100^0; 7^2 + 2^2; 5 \times 11$ $4^2 - 2; 8^2 - 3^2$
 $3^2; 9 \times 10 + 1; 3^2 \times 11; 10^2 - 7^2; 12^2 - 102; 2 \times 3^3 - 1$
 $10^2 - 3^2; \sqrt{25}; 2^3 \times 11; 11^2 - 70; 4^3 - \sqrt{81}; 10^2 - 99$
 $= 42; 63; 53 \quad 5; 53; 37; 99; 53; 42 \quad 42; 99; 53; 51; 5; 73; 99; 53 \quad 91; 5$
 $9; 91; 99; 51; 42; 53 \quad 91; 5; 88; 51; 55; 1$
= THE SECRET TREASURE IS HIDDEN ON PIRATE ISLAND.

15. Own exercise and opinion – there are many different ways to get to those numbers.
Encourage students to think of more complex ways of getting to the number and not the easiest way they can think of.

