

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

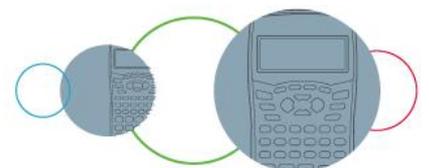
d) $(x^m \times y^n)^p = x^{m \times p} y^{n \times p}$

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



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

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

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

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

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

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

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

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

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

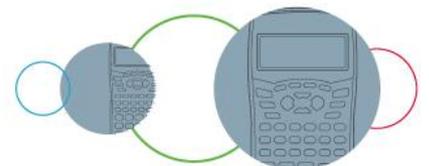
$$\begin{aligned}
 \text{f) } \quad & 29 = x^2 + 4 \\
 & x^2 = 25 \\
 & x = \sqrt{25} \\
 & x = 5
 \end{aligned}$$

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

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

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

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



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

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.

