

# SHARP

## Worksheet 3: Exponents

### Grade 8 Mathematics

1. Label the letters a, b and c in the diagram below:

$$a^b \} c$$

2. Find the answers for each of these – do not use your calculator:

- |          |          |           |
|----------|----------|-----------|
| a) $4^2$ | b) $9^2$ | c) $6^3$  |
| d) $8^2$ | e) $1^3$ | f) $10^2$ |
| g) $2^3$ | h) $1^2$ | i) $2^2$  |
| j) $7^2$ | k) $5^3$ | l) $11^2$ |
| m) $6^2$ | n) $3^3$ | o) $5^2$  |
| p) $3^2$ | q) $4^3$ | r) $12^2$ |

3. Find the answers for the following by using your SHARP calculator:

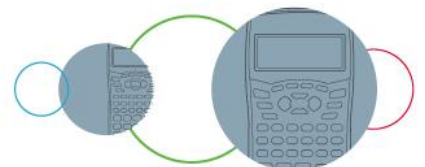
- |              |              |                    |
|--------------|--------------|--------------------|
| a) $7^3$     | b) $(-95)^2$ | c) $26^2$          |
| d) $(-43)^3$ | e) $(70)^2$  | f) $49\frac{3}{2}$ |

4. Give the answers for each these – do not use your calculator:

- |                   |                    |                    |
|-------------------|--------------------|--------------------|
| a) $\sqrt{16}$    | b) $\sqrt[3]{1}$   | c) $\sqrt{4}$      |
| d) $\sqrt[3]{64}$ | e) $\sqrt[3]{27}$  | f) $\sqrt{36}$     |
| g) $\sqrt[3]{8}$  | h) $\sqrt{25}$     | i) $\sqrt{81}$     |
| j) $\sqrt{144}$   | k) $\sqrt{100}$    | l) $\sqrt[3]{125}$ |
| m) $\sqrt{1}$     | n) $\sqrt{9}$      | o) $\sqrt{49}$     |
| p) $\sqrt{121}$   | q) $\sqrt[3]{216}$ | r) $\sqrt{64}$     |

5. Find the answers for the following by using your SHARP calculator (round off to two decimal places where necessary):

- |                       |                       |                        |
|-----------------------|-----------------------|------------------------|
| a) $\sqrt[3]{(-6)^3}$ | b) $(\frac{16}{5})^3$ | c) $\sqrt[3]{-204}$    |
| d) $(-17)^2$          | e) $\sqrt[3]{-10}$    | f) $\sqrt[2]{0.04}$    |
| g) $\sqrt{(-76)^2}$   | h) $(-\frac{1}{2})^2$ | i) $\sqrt[3]{-3\ 888}$ |



6. Represent the following in simplest exponential form:

a)  $3 \times 3 \times 3 \times 3 \times 3 \times 3$

b)  $(-7) \times (-7) \times (-7)$

c)  $a \times a \times a \times a \times a \times a \times a \times a \times a$

d)  $50 \times 50 \times 50 \times 50 \times 50$

e)  $b \times b \times b \times c \times c \times c \times c \times c \times c$

f)  $x \times x \times y \times y \times y \times y \times z \times z \times z \times w$

7. Write each of these numbers in scientific notation:

a) one million and three hundred thousand

b) 2 870 000 000 000

c) 36 020 000

d) 58 996

e) 6 015

f) 240

8. Change the numbers written in scientific notation into their original form:

a)  $2.376 \times 10^4$

b)  $5.8 \times 10^7$

c)  $9.006 \times 10^8$

d)  $3.191 \times 10^0$

e)  $3.6 \times 10^2$

f)  $2.2345 \times 10^5$

9. Use BEDMAS to answer these questions without using your calculator:

a)  $(7 - 3)^3 + 1$

b)  $(3)(3)(3) + (2)^3$

c)  $(-4)^3 + (-4)^2$

d)  $5^4 \div 5^2$

e)  $(2 \times 3)^2 + (9 \div 3)^3$

f)  $(-2)^2(-3) + 4^2$

10. Complete the following laws for exponents:

a)  $x^m \times x^n = ?$

b)  $x^m \div x^n = ?$

c)  $(x^m)^n = ?$

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

e)  $x^1 = ?$

f)  $x^0 = ?$

11. Simplify the following:

a)  $a^2 \times a^3 \div a^4$

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

c)  $\frac{a^2bc}{c^3d} \div \frac{a^2b^2}{(cd)^2}$

d)  $\frac{ef^4}{(gh)^0} \times \frac{(g^0h)^2}{e^3f}$

e)  $\frac{x^3y^2z^3}{(x^4y)^1} \times \frac{x^3y^4}{z^2} \div \frac{x^5y^5}{z^6}$

f)  $(x^2 + y^2)^0$

12. Solve for  $x$  in each of these equations:

a)  $x^2 = 100$

b)  $9^x = 81$

c)  $11^2 = x$

d)  $36 = x^2$

e)  $7^x = 49$

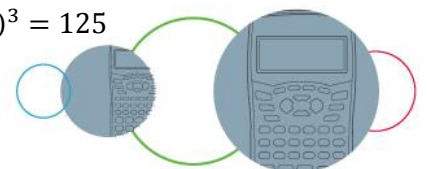
f)  $29 = x^2 + 4$

g)  $3^x + 2 = 29$

h)  $6^3 = x$

i)  $x = (3 + 4)^2$

j)  $(2 + x)^3 = 125$



13. Find the answers without using your calculator.

- |                                 |                                  |                            |
|---------------------------------|----------------------------------|----------------------------|
| a) $\sqrt[3]{0.008}$            | b) $\sqrt[3]{0.064}$             | c) $\sqrt{0.36}$           |
| d) $\sqrt{0.0016}$              | e) $\sqrt[3]{0.125}$             | f) $\sqrt{0.49}$           |
| g) $\sqrt{0.0064}$              | h) $\left(\frac{4}{10}\right)^2$ | i) $\sqrt[3]{\frac{1}{8}}$ |
| j) $\left(\frac{4}{5}\right)^3$ | k) $\left(\frac{1}{3}\right)^3$  | l) $\sqrt{\sqrt{16}}$      |

14. Below is the code for the letters of the alphabet. See if you can figure out the secret message:

A = 51	B = 78	C = 37	D = 1	E = 53	F = 93	G = 39
H = 63	I = 91	J = 82	K = 28	L = 88	M = 17	N = 55
O = 14	P = 9	Q = 67	R = 99	S = 5	T = 42	U = 73
V = 9	W = 77	X = 61	Y = 40	Z = 12		

Message:  $6 \times 7; 8^2 - 1; 7^2 + 2^2$        $2^2 + 1; 5.3 \times 10; 6^2 + 1; 9 \times 11; 2 \times 5^2 + 3; 7^2 - 7$   
 $6^2 + 6; 10^2 - 1; 8^2 - 11; 7^2 + 2; 3^2 - 2^2; 9^2 - 2^3; 9^2 + 4^2 + 2; 106 \div 2$        $9^2 + 10; 2^2 + 1$   
 $8^2 - 1; 4^3 + 3^3; 1^2; 100^0; 7^2 + 2^2; 5 \times 11$        $4^2 - 2; 8^2 - 3^2$   
 $3^2; 9 \times 10 + 1; 3^2 \times 11; 10^2 - 7^2; 12^2 - 102; 2 \times 3^3 - 1$   
 $10^2 - 3^2; \sqrt{25}; 2^3 \times 11; 11^2 - 70; 4^3 - \sqrt{81}; 10^2 - 99$

15. Math challenge: Use addition, subtraction, squares, cubes and their roots to get to the numbers 1 to 10, e.g. 11 can be found by saying  $6^2 - 5^2 = 36 - 25 = 11$ .

