FMP10
Unit 2 Pretest

KEY

1. Use exponent laws to simplify each expression:

a) $3^4 \times 3^5$ 3^9

b) $\frac{x^6}{x^2}$ x^4

c) $(5^2)^3$ 5^6

d) $(ab)^5$ a^5b^5

e) $(-3x^2y^7)(2xy^3)$ $-6x^3y^{10}$

f) $\frac{15a^6b^7}{3ab^4}$ $5a^5b^3$

g) $(3q^3)^4$ $81q^{12}$

h) $(5x^2y^3)^2(2xy)^3$ $(25x^4y^6)(8x^3y^3)$ $= 200x^7y^9$

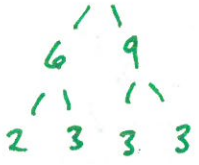
i) $\frac{(a^9b^7)^2}{(a^4b)^3}$ $\frac{a^{18}b^{14}}{a^{12}b^3}$ $= a^6b^{11}$

j) 15^0 1

k) -15^0 -1

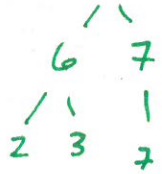
2. Use a factor tree to state the prime factorization of each number:

a) 54



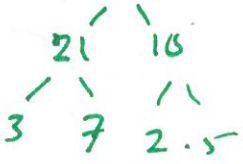
$2 \cdot 3 \cdot 3 \cdot 3$

b) 42



$2 \cdot 3 \cdot 7$

c) 210



$2 \cdot 3 \cdot 5 \cdot 7$

3. Use the prime factorization to determine the GCF and LCM of each group of numbers:

a) 54 & 42

$2 \cdot 3 \cdot 3 \cdot 3$
$2 \cdot 3 \cdot 7$

GCF $= 2 \cdot 3 = 6$

LCM $= 2 \cdot 3 \cdot 3 \cdot 3 \cdot 7 = 378$

b) 42 & 210

$2 \cdot 3 \cdot 7$
$2 \cdot 3 \cdot 5 \cdot 7$

GCF $= 2 \cdot 3 \cdot 7 = 42$

LCM $= 2 \cdot 3 \cdot 5 \cdot 7 = 210$

c) 54, 42 & 210

$2 \cdot 3 \cdot 3 \cdot 3$
$2 \cdot 3 \cdot 7$
$2 \cdot 3 \cdot 5 \cdot 7$

GCF $= 2 \cdot 3 = 6$

LCM $= 2 \cdot 3 \cdot 3 \cdot 3 \cdot 5 \cdot 7$
$= 1890$

4. Use the prime factorizations given to determine if each number represented is a perfect square, perfect cube, both or neither. Determine (using the prime factorization) any square root or cube root value as appropriate.

a) $2\times2\times2\times2\times2\times2\times3\times3\times3\times5\times5\times5 = 2^6 3^3 5^3$

$2\cdot2\cdot3\cdot5$ $2\cdot2\cdot3\cdot5$ $2\cdot2\cdot3\cdot5$

Perfect cube $\sqrt[3]{\ } = 2\cdot2\cdot3\cdot5 = 60$

b) $2\times2\times3\times3\times3\times3\times3\times3\times7\times7\times7\times7\times7\times7 = 2^2 3^6 7^6$

$2\cdot3\cdot3\cdot3\cdot7\cdot7\cdot7$ $2\cdot3\cdot3\cdot3\cdot7\cdot7\cdot7$

Perfect square $\sqrt{\ } = 2\cdot3\cdot3\cdot3\cdot7\cdot7\cdot7 = 18522$

c) $2\times2\times2\times2\times2\times2\times3\times3\times3\times3\times3\times3\times3\times3\times3\times3\times3\times3 = 2^6\cdot3^{12}$

Perfect square $\sqrt{2^6\cdot3^{12}} = 2^3\cdot3^6 = 5832$

Perfect cube $\sqrt[3]{2^6\cdot3^{12}} = 2^2\cdot3^4 = 324$

d) $5\times5\times5\times7\times7 = 5^3\cdot7^2$

Neither

5. Determine each root:

a) $\sqrt{169x^2y^{10}} = 13xy^5$

b) $\sqrt[3]{125x^6y^9} = 5x^2y^3$

c) $\frac{\sqrt{25a^{16}}}{\sqrt[4]{81b^{12}}} = \frac{5a^8}{3b^3}$

6. A cube has volume 216 cm^3. Determine the surface are of the cube.

Let x = side length of cube

$V = x^3 = 216$

$x = \sqrt[3]{216}$

$x = 6$ cm

$SA = 6x^2 = 6(6)^2$

$= 216\ cm^2$

7. The surface are of a cube is 864 m^2. Determine the diagonal distance across one face of the cube.

$\frac{6x^2}{6} = \frac{864}{6}$

$x^2 = 144$

$x = \sqrt{144}$

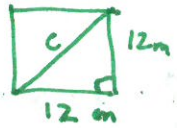
$x = 12$

$12^2 + 12^2 = c^2$

$288 = c^2$

$\sqrt{288} = c$

$c = 16.97$m



8. Write each expression with positive exponent:

a) x^{-5} $\frac{1}{x^5}$

b) $(-5)^{-3}$ $\frac{1}{(-5)^3}$

c) $\frac{1}{q^{-6}}$ q^6

d) $\left(\frac{5}{4}\right)^{-4}$ $\left(\frac{4}{5}\right)^4$

e) $(3x)^{-3}$

$\frac{1}{(3x)^3}$

f) $3x^{-3}$

$\frac{3}{x^3}$

g) a^5b^{-7}

$\frac{a^5}{b^7}$

h) $\frac{-5a^2b^{-4}c^{-1}}{2d^{-3}e^5}$

$\frac{-5a^2d^3}{2b^4ce^5}$

9. Simplify each expression:

a) $(x^{-3})(x^5)$

x^2

b) $(y^5)(y^{-7})$

$y^{-2} = \frac{1}{y^2}$

c) $\frac{5^{-4}}{5^{-7}}$

5^3

d) $\frac{(-3)^4}{(-3)^7}$

$(-3)^{-3} = \frac{1}{(-3)^3}$

e) $(m^3)^{-2}$

$m^{-6} = \frac{1}{m^6}$

f) $(n^{-3})^{-4}$

n^{12}

g) $(2x^{-3}y^4)^{-2}$

$2^{-2}x^6y^{-8} = \frac{x^6}{4y^8}$

h) $\left(\frac{k^8}{k^{-2}}\right)^3$

$(k^{10})^3 = k^{30}$

10. Simplify then evaluate each expression (no decimal answers):

a) $(0.75^2)^{-3}$

$(3/4)^{-6} = (4/3)^6 = 4^6/3^6 = \frac{4096}{729}$

b) $[3^3 \times 3^{-5}]^2$

$[3^{-2}]^2 = 3^{-4} = \frac{1}{3^4}$

c) $\left[\frac{(-2)^{-10}}{(-2)^{-8}}\right]^{-3}$

$\frac{[(-2)^{-2}]^{-3}}{(-2)^6}$

11. A colony of beetles has a current population of 48,600 and triples every year.

a) Write a formula that will determine the population P after n number of years.

$P = 48600(3)^n$

b) Use your formula to determine the number of beetles in 7 years.

$P = 48600(3)^7$

$= 106,288,200$

c) Use your formula to determine the number of beetles 5 years ago

$P = 48600(3)^{-5}$

$= \frac{48600}{3^5}$

$= 200$