Unit Test Review

Approx. 15 problems

- Rearranging formulas
- Evaluating expressions

$$125\left(1+\frac{0.25}{10}\right)^{-10}=?$$

- Simplify expressions using exponent laws

$$x^{\frac{1}{n}}=\sqrt[n]{x} \qquad x\geq 0$$

$$x^{\frac{m}{n}}=\left(\sqrt[n]{x}\right)^m = \sqrt[n]{x^m}$$

$$x^m \times x^n = x^{m+n}$$

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

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

$$\left(\frac{x}{y}\right)^m=\frac{x^m}{y^m},\ y\neq 0$$

$$(xyz)^m = x^m y^m z^m$$

$$x^{-m}=\frac{1}{x^m},\ x\neq 0$$

$$x^0=1,\ x\neq 0$$

- Solve exponential equation algebraically and/or using G.C.

- 7 word problems

$$y=a\,b^x$$

a – starting amount
b – growth/decay factor
x – time in years
y – final amount

$$\boxed{b=1\pm i}$$

i – amount by which something increases/decreases (appreciate/depreciate)

$$P=P_0(2)^{\frac{t}{d}} \longleftarrow \text{doubling}$$

$$H=H_0\left(\tfrac{1}{2}\right)^{\frac{t}{h}} \longleftarrow \text{half life}$$

Quiz Solutions

[4] 1. A police officer uses the formula $S = 15.9\sqrt{df}$ to estimate the speed of a vehicle when it crashed. In the formula, S kilometers per hour is the speed of the vehicle, d metres is the length of the skid marks left on the road, and f is the coefficient of friction, a measure of the traction between the road surface and the vehicle's tires.
A car travelling at 30km/h skids and crashes in an icy parking lot. Calculate the length of the skid marks at the crash site if f ≐ 0.35 for an icy road.

Solution: $S = 15.9\sqrt{df}$

Given: $S = 30$ km/h
$f \doteq 0.35$

Find $d = ?$

Sub. s and f in $S = 15.9\sqrt{df}$ and solve for d.

$$30 = 15.9\sqrt{0.35d} \quad / \div 15.9$$

$$\frac{30}{15.9} = \sqrt{0.35d}$$

$$1.89 \doteq \sqrt{0.35d} \quad /^2$$

$$(1.89)^2 \doteq (\cancel{\sqrt{}}0.35d)^{\cancel{2}}$$

$$(1.89)^2 = 0.35d \quad / \div 0.35$$

$$\frac{(1.89)^2}{0.35} = d$$

$$\boxed{d \doteq 10.21}$$

∴ The length of the skid mark is approx. 10.2 m.

[5] 2. Simplify each expression.

a) d^5d^{-2}

$= d^{5+(-2)}$

$= d^{5-2}$

$= d^3$

b) $\frac{c^{11}}{c^{-3}}$

$= c^{11-(-3)}$

$= c^{11+3}$

$= c^{14}$

c) $w^{-8}(w^3)^2$

$= w^{-8}\ w^{3\times 2}$

$= w^{-8}\ w^{6}$

$= w^{-8+6}$

$= w^{-2}$

$= \frac{1}{w^2}$

[5] 3. Simplify.

a) $(2f)^4$

$= 2^4 f^4$

$= 16 f^4$

b) $\frac{(5x)^2(2y)^3}{10xy^2}$

$= \frac{5^2 x^2\ 2^3 y^3}{10 x y^2}$

$= \frac{25 x^2\ 8 y^3}{10 x y^2}$

$= \frac{200 x^2 y^3}{10 x y^2}$

$= \left(\frac{200}{10}\right)\left(\frac{x^2}{x}\right)\left(\frac{y^3}{y^2}\right)$

$= 20 x^{2-1} y^{3-2}$

$= 20 x y$

[3] 4. Evaluate.

a) $\left(\frac{2}{3}\right)^3 = \frac{2^3}{3^3}$

$= \frac{2\times2\times2}{3\times3\times3}$

$= \frac{8}{27}$

b) $-2^4 = -(2\times2\times2\times2)$

$= -16$

$(-2)^4 = (-2)(-2)(-2)(-2)$

$= 16$

c) $\left(\frac{1}{5}\right)^{-2} = \left(\frac{5}{1}\right)^2$

$= \frac{5^2}{1^2}$

$= 25$

$\left(\frac{2}{3}\right)^{-2} = \left(\frac{3}{2}\right)^2$

$= \frac{3^2}{2^2}$

$= \frac{9}{4}$

[3] 5. Simplify $\left[(-2)^{-4}\right]^3$, then evaluate.

$\left[(-2)^{-4}\right]^3 = (-2)^{(-4)\times3}$

$= (-2)^{-12}$

$= \frac{1}{(-2)^{12}}$

$= \frac{1}{4096}$

Example 4: The cost of a large chocolate bar, **in dollars**, has increased according to the formula, $C = 0.9(1.06)^x$ where x is the number of years after 2008. Since 2008, what has been the annual percent increase in the cost of a candy bar?

Solution: $b = 1.06$

$b = 1 + i$

$1.06 = 1 + i$

$1.06 - 1 = i$

$i = 0.06$

$\therefore \boxed{i = 6\%}$

$\therefore$ The annual increase is 6%.

Review: Pg. 400: #1–5, 7–13, 15, 19, 21, 23-25