$A = 2(38)\sqrt{27^2 + \frac{38^2}{4}}$

$A = 76\sqrt{729 + 361}$

$A = 76\sqrt{1090}$

$A = 76(33)$

$A = 2509$

∴ the surface area is 2509 m²

Name: _____

Math 12: Exponetial Functions Assignment

Written Solutions: Provide clear solutions to the following problems. Write your solutions on the Answers Booklet. You will receive a ***Communications grade, out of 5*** for how well your math is presented.

1. The surface area of a square-based pyramid is $A = 2b\sqrt{h^2 + \frac{b^2}{4}}$, where h is the height of the pyramid and b is the width of the base.
   Determine the surface area of a square-based pyramid with base 38 m wide and height 27 m.

2. A gasoline tank is a cylinder with radius 1.5 m and height 6.7 m.
   One cubic metre is 1000 litres.
   Assuming the price of gas is $1.34/L, estimate the value of the gas in a full tank.

$V = \pi r^2 h$

$V = \pi(1.5)^2(6.7)$

$V = 47.4\ m^3$

$47.4 \times 1000 = 47400\ l$

$47400 \times 1.34 = \$63516.00$

∴ the value of the gas is $63,516.00

3. The formula $d = \frac{1}{2}at^2$ gives the displacement, d metres, of an object that accelerates from rest at a metres per second squared for t seconds.
   Determine how long it takes for an object accelerating from rest at 3.6 m/s² to be displaced 11 m.

4. Simplify $u^2u^{-5}u$.

5. Simplify $\frac{(y^2)^{-4}}{y^{-18}y^5}$, then evaluate for $y = 2$.

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6. Explain the meaning of the exponent in the expression $64^{\frac{1}{6}}$.

7. Rewrite $\sqrt[3]{-0.343}$ using rational exponents and evaluate.

8. Rewrite $243^{\frac{3}{5}}$ in radical form and evaluate.

9. Solve for x in the equation $x^{\frac{5}{2}} = 0.00243$. Assume x is positive.

10. Solve for x in the equation $x^4 = 81$. Assume x is positive.

11. A sample of iodine-125 undergoes radioactive decay.
The equation $M = 17(0.976)^{\frac{t}{2}}$ gives the mass M grams of iodine-125 remaining after t days.
Determine the initial mass and the mass remaining after 50 days.

12. The formula $D = 0.099M^{\frac{9}{10}}$ gives the drinking rate, D litres per day, of a mammal with body mass M kilograms.
Determine the body mass of a mammal with a drinking rate of 25 L/day.

13. Express 8 as a power of 2.

$d = \frac{1}{2}at^2$

$11 = \frac{1}{2}(3.6)(t)^2$

$\frac{11}{1.8} = \frac{1.8(t)^2}{1.8}$

$6.1 = t^2$

$\sqrt{6.1} = t$

$t = 2.5$ sec.

∴ It takes 2.5 sec for the object to be displaced.

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$u^2u^{-5}u = u^{-2}$

$\dfrac{(y^2)^{-4}}{y^{-18}y^5} = \dfrac{y^{-8}}{y^{-13}} = y^{8}\,y^{13} = y^{\frac{1}{5}}$

the sixth root of 64

$2^5 = 32$

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$x^{\frac{5}{2}} = 0.00243^{\frac{2}{5}}$

$x = \left(\sqrt[5]{0.00243}\right)^2$

$7x - 0.09$

14. Solve the equation $x - 3 = 2 - 7x$.

15. Solve the equation $3^{2x} = 9$ algebraically, by getting both sides of the equation as powers of the same base (base 3 in this case)..

16. Solve the equation $9^{2-5x} = 1$ algebraically.

17. Solve the equation $5^{3x-4} = 125^{-x}$ algebraically.

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13. Express 8 as a power of 2.

$\sqrt[4]{81} = 3$

$m = 17(0.976)^{\frac{50}{25}}$

$m = 17(0.976)^{1}$

$m = 17(0.5448)$

$m = 9.3\text{g}$

∴ the initial mass is 17g and the mass after 50 days is 9.3g.

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$\frac{25}{0.099} = \frac{0.099M^{\frac{9}{10}}}{0.099}$ $\therefore M = 467\text{ kg}$

$\left(\frac{10}{9}\right)252.5 = M\left(\frac{9}{10}\right)\left(\frac{10}{9}\right)$

$466.85 = M$

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19. Hillary walks to work in the winter with a cup of coffee.

    The cup of coffee's temperature, T degrees Celsius, after m minutes is modelled by the equation $T = 75(2)^{-\frac{m}{6}}$.
    Determine how long it takes for the temperature of the coffee to reach 26°C.

20. The value, V dollars, of a new truck t years after purchase is $V = 45\,500(0.91)^t$.
    Determine when the truck is worth $25,500

Determine the body mass of a mammal with a drinking rate of 25 L/day.

13. Express 8 as a power of 2.

$8 = 2^3$

1

$+7x \quad -3 = 2 \quad -7x + 7x$

$\frac{8x}{8} = \frac{5}{8}$

$x = \frac{5}{8}$

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    After n years, the amount of the investment is given by $A = 800(1.067)^n$.

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    After n years, the amount of the investment is given by $A = 800(1.067)^n$.
    Determine how long it takes for the investment to grow to \$1600.

22. The population P of a new town doubles every 26 months.
    Write an equation using the doubling formula found in your text, and determine the population n months after the town had a population of 1700. (Note that the *initial* population is 1700.)

23. The isotope iodine-131 is used as a tracer in medical imaging. It has half-life of about 8 days.
    Using the half-life formula found in your text (or ask for help) estimate the number of days it takes for a 180 mg sample of iodine-131 to decay to a mass of 20 mg.

24. A shipping company charges a fixed cost per package plus a variable cost per kilogram.
    The price, c dollars, of shipping a m kilogram package is $c = 3m + f$, where f is the fixed cost per package.
    a) Rearrange the formula to isolate m.
    b) Determine the mass of a package that costs \$11.47 to ship with a fixed cost of \$6.45.
    c) If a 2.92-kg package costs \$13.98 to ship, what is the fixed cost?