## The Dragon Academy G11 Functions and Applications Term 4 Test 1

## June 5, 2019

## NAME:

All questions weigh the same towards the mark of this test. You may use your calculator.

- 1. (KtiCa) Simplify and leave your answer as required in each case:
  - a) As single power with positive exponent:  $\left(\frac{(5^3)^2}{5(5^6)}\right)^{-1}$  b) As a fraction or integer:  $\left(\frac{10^{-3}}{10^{-5}}\right)^2$ c) As fraction or integer:  $4^{-2} + 3^0 - 2^{-3}$  d) As a power of  $\left(\frac{1}{2}\right)$ :  $\left(\frac{1}{4}\right)^3$
- 2. (KtiCA) The radioactive isotope  $U_{238}$  has a half-life of  $4.5 \cdot 10^9$  yrs. Write a function that models the radioactive decay of this isotope.
- 3. (ktiCA) A rubberl ball is dropped from a height of 5m and it bounces to a height that is 80% of its previous maximum height after each bounce. If the height after n bounces is modelled by the function  $H(n) = 5 \cdot 0.8^n$ . Determine the height of the ball after 4 bounces.
- 4. (KticA) Tresha paid some purchases with a credit card, but forgot to pay the monthly bill of \$465. The credit card company charges 19.5%/a compounded daily. How much does Tresha ends up paying if she pays it all back after 15 days?
- 5. (kTIcA) A tree is growing vertically on a hills ide that is inclined at an angle of  $15^{\circ}$  to the horizontal. The tree casts a shadow uphill that extends 7m from the base of its trunk when the angle of elevation of the Sun is  $57^{\circ}$ . Determine the height of the tree to the nearest meter. See figure 1.



Figure 1: Problem settings for exercises 5

- 6. For the following periodic function  $f(x) = \frac{1}{2} + \frac{5}{2}\cos(30 \cdot x)$ , determine its
  - a) Maximum value,  $y_{max}$  b) Minimum value,  $y_{min}$
  - d) Equation of the mid axis,  $y_{\mbox{mid}}$   $\,$  e)  $\,$  Period, T

- c) Amplitute, A
- f) Sketch the function. Note: The goal is that your sketch reflects qualitatively the values you obtained before.