Quiz 3

Key

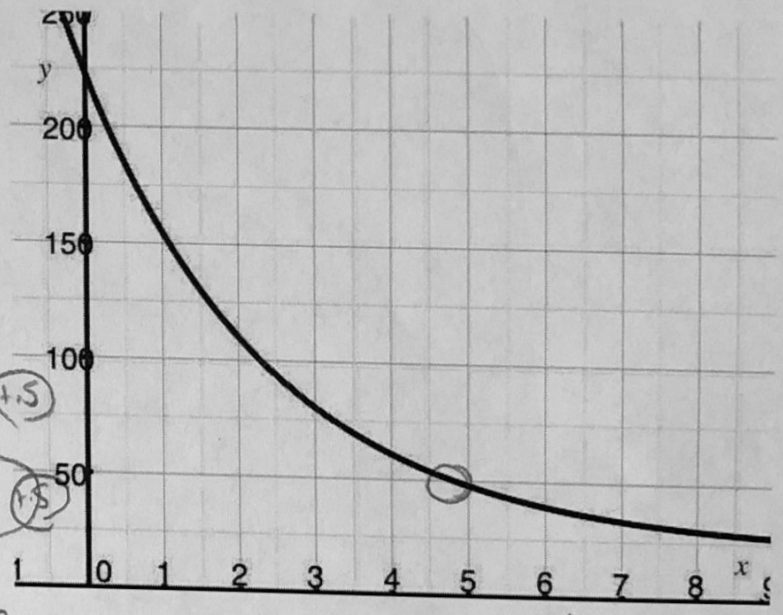
This is a two-stage quiz. You will be given this sheet of paper twice.

The first (colored) copy of the quiz corresponds with the first stage. Use your knowledge & calculator to take this quiz–no notes, books, internet resources, faculty, tutors or colleagues. You have 15 minutes.

The second (white) copy of the quiz corresponds with the second stage. You are now welcome to use your books, notes, and students in the class to retake the same quiz. You have 15 minutes to complete the quiz and to build one solution to be turned in (with everyone's name on top!).

Show *all* your work. Reasonable supporting work must be shown for any partial credit.

1. A metal block's temperature, T is modeled by $T = 200 \cdot 4^{-0.3x} + 23$ where x is in hours.



(a) [1] What is the initial temperature of the metal block? $x=0$ (+.5)

$200 \cdot 4^{-.3 \cdot 0} + 23 = 223$ (+.5)

(b) [2] What is the range of the function T.

(+.5) y-values

graph reading (+.5)

graph and $200 \cdot 4^{-.3x}$ shifted up 23 so $(23, \infty)$ (+1)

if $(0, \infty)$ +1

(c) [4] Find when the temperature reaches 50°.

find x when

(+1) $50 = 200 \cdot 4^{-.3x} + 23$

$-23 \quad -23$

order of op (+1) $\frac{27}{200} = \frac{200 \cdot 4^{-.3x}}{200}$

$\frac{27}{200} = 4^{-.3x}$

use log (+.5) use right (+.5)

$\ln\left(\frac{27}{200}\right) = \ln(4^{-.3x})$

$\ln\left(\frac{27}{200}\right) = -.3x \ln 4$ (+1)

$x = \frac{\ln\left(\frac{27}{200}\right)}{-.3 \ln 4}$

$\log_4\left(\frac{27}{200}\right) = -.3x$

$x = \frac{\log_4\left(\frac{27}{200}\right)}{-.3}$

$x \approx 4.815$

2. [3] Given that $\log_3(x) = 4$ and $\log_3(y) = -2$ find $\log_3(x^2 \cdot y)$.

$\log_3(x^2 \cdot y)$

prop used right (+.5) (+1) $= \log_3(x^2) + \log_3 y$

$= 2\log_3(x) + \log_3(y)$

subst (+1) $= 2 \cdot 4 + (-2) =$ (+.5) 6

OR

$\log_3(x) = 4 \Rightarrow 3^4 = x$

$\log_3(y) = -2 \Rightarrow 3^{-2} = y$

so $\log_3(x^2 \cdot y) = \log_3([3^4]^2 \cdot 3^{-2})$