Name _____ Class _____ Date _____

7-6 Standardized Test Prep

Natural Logarithms

Multiple Choice

For Exercises 1–4, choose the correct letter. Do not use a calculator.

1. What is $3 \ln 5 - \ln 2$ written as a single natural logarithm?

(A) $\ln 7.5$ (B) $\ln 27$ (C) $\ln \left(\frac{5}{2}\right)^3$ (D) $\ln 62.5$

2. What is the solution of $e^{x+1} = 13$?

(F) $x = \ln 13 + 1$ (G) $x = \ln 13 - 1$ (H) $x = \ln 13$ (I) $x = \ln 12$

3. What is the solution of $\ln(x - 2)^2 = 6$?

(A) $2 + e^3$ (B) $2 - e^3$ (C) $2 \pm e^3$ (D) $2 \pm e^6$

4. What is the solution of $e^{\frac{x}{2}+1} + 3 = 8$?

(F) $x = 2 \ln 5 - 1$ (G) $x = 2 \ln 5 - 2$ (H) $x = 2 \ln 4$ (I) $x = \frac{1}{2}(\ln 5 - 1)$

Short Response

5. The maximum velocity v of a rocket is $v = -0.0098t + c \ln R$. The rocket fires for t seconds and the velocity of the exhaust is c km/s. The ratio of the mass of the rocket filled with fuel to the mass of the rocket without fuel is R. A spacecraft can attain a stable orbit 300 km above Earth if it reaches a velocity of 7.7 km/s.

a. What is the velocity of a spacecraft whose booster rocket has a mass ratio of 16, an exhaust velocity of 3.2 km/s, and a firing time of 40 s?

b. Can this rocket attain a stable orbit 300 km above Earth? Explain in words or show work for how you determined your answer.