Name _____ Date _____ Class _____

CHAPTER 7

Performance Assessment Teacher Support

Exponential and Logarithmic Functions

Purpose:

To assess student understanding of solving problems involving exponential and logarithmic functions.

Time:

20−30 minutes

Grouping:

Individuals or partners

Preparation Hints:

Review the general equation for exponential growth $\left(A = A_0 e^{rt}\right)$ and how to solve an exponential equation by taking the appropriate log of both sides.

Introduce the Task:

Students are presented with a problem involving exponential growth. Students must determine the rate of growth for doubling in a given time and then use that rate to figure out the length of time needed for tripling.

Performance Indicators:

_____ Sets up equation to find rate for doubling.
_____ Solves equation to find growth rate.
_____ Sets up equation to find time for tripling.
_____ Solves equation to find tripling time.
_____ Correctly interprets result.

Scoring Rubric:

Level 4: Student solves problems correctly and gives good explanations.

Level 3: Student solves problems but does not give satisfactory explanations.

Level 2: Student solves some problems but does not give satisfactory explanations.

Level 1: Student is not able to solve any of the problems.

Name _____ Date _____ Class _____

CHAPTER 7

Performance Assessment

Exponential and Logarithmic Functions

It takes 12 hours for a certain bacterial culture to double in size. How long will it take the same bacterial culture to triple in size?

1. Set up the equation that states that it takes 12 hours for the culture to double in size.

_____

2. Solve the equation for *r*.

_____

3. Set up the equation to find the length of time necessary for the culture, growing at the rate determined in step 2, to triple in size.

_____

4. Solve the equation for *t*.

_____

5. Check for reasonableness.

_____

21. 4 and 5

22. 4×10^{-3}

Performance Assessment

1. $2P_0 = P_0\, e^{rt}$; $2P_0 = P_0\, e^{12r}$

2. $2P_0 = P_0\, e^{12r}$; $\ln 2 = \ln e^{12r}$; $r = \frac{\ln 2}{12} \approx 0.05776$

3. $3P_0 = P_0\, e^{rt}$; $3P_0 = P_0\, e^{0.05776t}$

4. $3P_0 = P_0\, e^{0.05776t}$; $\ln 3 = \ln e^{0.05776t}$; $t = \frac{\ln 3}{0.05776} \approx 19.02$

5. If it takes 12 hours to double, it would take 24 hours to quadruple, so for tripling, the answer should be somewhere between 12 and 24, and probably not too far from 18.

Cumulative Test

1. B

2. H

3. B

4. G

5. A

6. F

7. C

8. J

9. A

10. H

11. B

12. J

13. C

14. F

15. B

16. H

17. B

18. H

19. B

20. J

21. C

22. H

23. C

24. H

25. B

26. F

27. A

28. G

29. B

30. G

31. A

32. H

33. D

34. G

35. A

36. H

37. D

38. J

39. B

40. G

41. A

42. G

43. A

44. G

45. A

46. F

47. A

48. J