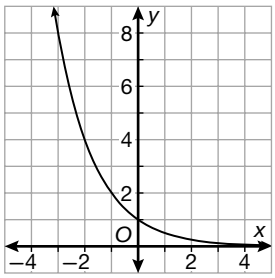
Warm Up 47

1. base
2. $\frac{8}{125}$
3. -5

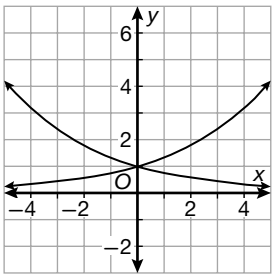
Lesson Practice 47

a.



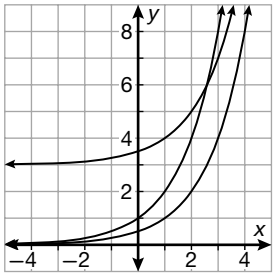
The domain is the set of all real numbers. The asymptote is the line $y = 0$ (the x-axis). The range is the set of all positive real numbers.

b.



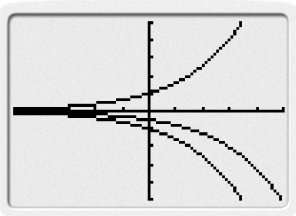
Because the functions have the form $y = b^x$ and the bases are reciprocals, the graphs are reflection images of each other over the y-axis.

c.



y_1 is the parent function of all exponential functions with base 2. The domain of all the functions is the set of all real numbers. The range of y_1 and y_2 is the set of all positive real numbers. The range of y_3 is the set of all real numbers greater than 3. The graph of y_2 is a vertical compression of the graph of y_1 by a factor of $\frac{1}{2}$. The graph of y_3 is a vertical shift 3 units up of the graph of y_2.

d.



y_1 is the parent function of all exponential functions with base 1.6. The graph of y_2 is a reflection of the graph of y_1 over the x-axis. The graph of y_3 is a vertical compression of the graph of y_2 by a factor of $\frac{1}{2}$.

e. \$1126.49 if compounded quarterly; \$1127.16 if compounded monthly

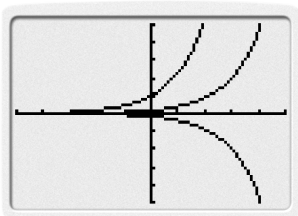
Practice 47

1. $\dfrac{3x^2 + 21x + 36}{14x^3 + 25x^2 + 62x + 16}$

2. B

3. $x = \dfrac{x_1 + x_2}{2}$

4. Graph y_1 is the parent function of all graphs with base 2.3. Graph y_2 is a vertical compression of y_1 by a factor of $\frac{1}{6}$. Graph y_3 is a reflection of y_2 over the x-axis.

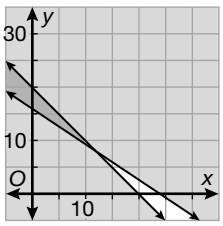


5. $\dfrac{5x^2p - 4p^2m + c}{p^2m}$

6. $\dfrac{3x^2y^2m + 4}{x}$

7. $2x^2 - x - 4$ ft/s

8. a. $x + y \leq 20$
   $10x + 15y \geq 240$



b. Possible description: All meaningful solutions are the ordered pairs of the solution set on and inside the triangle whose left side is the segment from (0, 20) to (0, 16).

c. (0, 20), (0, 16), (12, 8); Possible description: (0, 20) represents 0 hours in the library and 20 hours landscaping for total earnings of $300; (0, 16) represents 0 hours in the library and 16 hours landscaping for total earnings of $240; (12, 8) represents 12 hours in the library and 8 hours landscaping for total earnings of $240.

9. Assuming the inequality is in slope-intercept form:

   $<$, shade below and use a dashed line

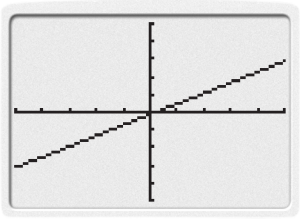
   $\leq$, shade below and use a solid line

   $>$, shade above and use a dashed line

   $\geq$, shade above and use a solid line

10. 3.25 seconds

11. All three lines coincide.



12. \$3541.65

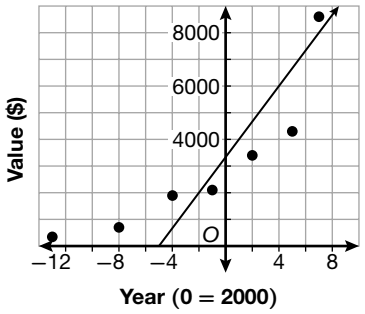
13. yes

14. yes

15. The product of an expression and its radical conjugate is a rational number. When multiplying a binomial with its conjugate, the first terms and the last terms are squares of the radical terms. This eliminates the radical from those terms. The inner multiplications will cancel each other as the sum of opposite terms is 0, so the multiplication results in a rational number with no radicals.

16. The coefficient matrix has determinant 0. The numerator matrices, however, are non-zero, indicating that there are no solutions. Indeed, the two equations are inconsistent.

17. $30^2 + 72^2 = 900 + 5184 = 6084$ and $78^2 = 6084$

18. 

19. The student did not completely simplify the expression because the square root of 12 can be simplified. $2\sqrt{12} = 2\sqrt{4}\sqrt{3} = 4\sqrt{3}$

20. $\frac{2}{3x}$

21. $y = 2.0284x + 2.5$ and $y = 2.0284x + 7.5$; the lines are parallel

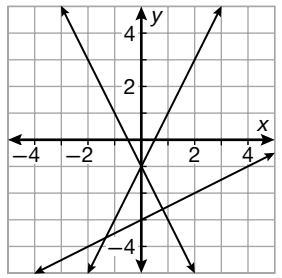
22. $y = -2$; Possible explanation: The y-coordinate of every point on the line is -2.

23. a. Yes, the GCF in the numerator is 3, which does not cancel out with the 2 in the denominator.

    b. No, the denominator will never be 0.

24. 202 feet

25. The lines form a triangle.



26. A

27. $|5| = 5$

28. $|-7| = 7$

29. $|9| = 9$

30. A