Name

LESSON MASTER 3-1

Questions on SPUR Objectives
See pages 225–229 for objectives.

Vocabulary

1. Explain what is meant by a *parent function.*

2. Describe the asymptotes and point of discontinuity of the graph of the function $f(x) = \frac{1}{x^2 - 3x - 4}$. Use an automatic grapher if needed.

Representations Objective J

In 3–5, give an equation of a parent function whose graph has the given features.

3. an asymptote but no points of discontinuity

4. points of discontinuity but no asymptotes

5. two asymptotes

6. a. Give an equation for the parent function of a parabola with equation $y = 3(x - 2)^2 + 2$.

b. Graph $y = 3(x - 2)^2 + 2$ and its parent function on an appropriate viewing window of an automatic grapher. Give the intervals of x- and y-values for your window.

c. In the screen at the right, sketch what you see on your window.

d. Describe the relationship between the two graphs.

Name

LESSON MASTER 3-2

Questions on SPUR Objectives
See pages 225–229 for objectives.

Properties Objective C

1. Let T be the transformation T: $(x, y) \rightarrow (x + 5, y - 6)$. Find an equation for the image of $y = x^3 + \frac{3}{2}$ under T. _____

2. Give an equation for the transformation T which moves each point 9 units down and 3 units to the right. _____

3. What transformation maps the graph of $y = |x|$ onto the graph of $y = |x - 8| + 15$? _____

Properties Objective D

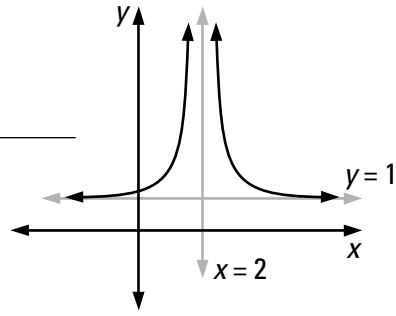
4. What are the zeros and the asymptotes of the graph of $y = \frac{1}{x}$ under the translation $T(x, y) = (x + 3, y - 1)$?

_____

5. *True or false.* A translation does not change the number of asymptotes of a graph. _____

Representations Objective K

6. a. Use the Graph-Translation Theorem to write an equation for the graph at the right. An equation for the parent function is $y = \frac{1}{x^2}$. _____



b. Use your equation in part a to find the value of the graphed function at $x = 11$. _____

7. Consider the function t given by $t(x) = (x - 5)^3 - 2$.

a. Give an equation for the parent function of t. _____

b. What transformation maps the parent function onto t? _____

c. Use an automatic grapher to graph t and its parent function on the same window. Choose an appropriate window for viewing key features of both graphs. In the screen at the right, sketch what you see on your window.

d. Identify the x- and y-intercepts of t and its parent function.

_____

_____

Name

LESSON MASTER 3-3

Questions on SPUR Objectives
See pages 225–229 for objectives.

Properties Objective E

1. A data set has a mean of 5 and a standard deviation of 2. Suppose 1,000 is added to each observation. What are the new mean and standard deviation?

_____

_____

2. A data set has a median of 35 and a mode of 30. Suppose 15 is added to each observation. What are the new mode and median?

_____

_____

Uses Objective I

3. A meteorologist takes a number of air-temperature readings and finds that the mean temperature is -24.66°C with a standard deviation of 2.27°C. He then decides to convert all of his measurements from degrees Celsius to degrees Kelvin. To do this, he uses the formula $K = C - 273.15$, where C is the temperature in degrees Celsius and K is the temperature in degrees Kelvin.

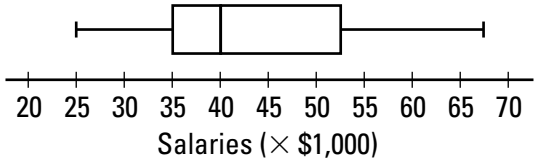
a. What is the mean air-temperature reading in degrees Kelvin?

_____

b. What is the standard deviation of air-temperature readings in degrees Kelvin?

_____

4. The box plot below displays the annual salaries of employees at Transformation Technologies, Inc., a small biotech company involved in cloning research.



Suppose, due to profit sharing, each employee receives an end-of-year bonus of $5,000. Which, if any, of the following descriptive statistics will change due to this bonus? If they change, give their new values.

a. median annual income

_____

b. interquartile range

_____

c. range

_____

d. outliers

_____

Name

LESSON MASTER 3-4

Questions on SPUR Objectives
See pages 225–229 for objectives.

Properties Objective F

In 1–4, decide whether the function with the given equation is *even*, *odd*, or *neither*. Justify your answer algebraically.

1. $s(t) = 8t^7$ _____

2. $f(x) = 7x^5 - 5x^2$ _____

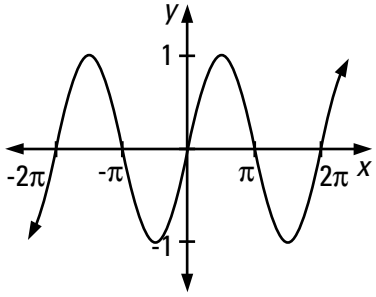
3. $g(h) = -9h^2 + 5$ _____

4. $v(m) = |7m + 2| - 5$ _____

Representations Objective L

In 5 and 6, decide whether the function whose graph is given is *even*, *odd*, or *neither*.

5.



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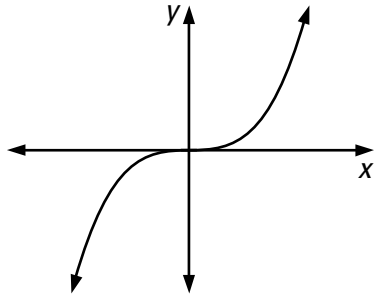
6.



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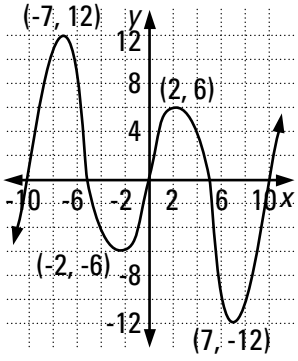
In 7 and 8, describe the symmetries of the graphed function.

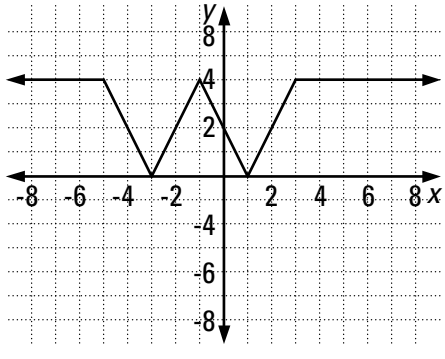
7.



_____

_____

8.



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_____

Name

LESSON MASTER 3-5

Questions on SPUR Objectives
See pages 225–229 for objectives.

Properties Objective C

1. Find the scale change S which shrinks a graph horizontally with a factor of $\frac{1}{6}$ and stretches it vertically with a factor of 8.

2. Find an equation for the image of $y = \sqrt{x^2 + 1}$ under the scale change S: $(x, y) \rightarrow \left(\frac{x}{3}, 3y\right)$.

3. Describe two different transformations S_1 and S_2 which map the graph of $y = x^2$ onto the graph of $y = \frac{9}{4}x^2$.

4. *Multiple choice.* Which scale change will map $y = \frac{\pi}{2}x^2$ so that the transformed graph includes the point (1, 1)?

(a) $S(x, y) = \left(\sqrt{\frac{2}{\pi}}x, \frac{2}{\pi}\right)$ (b) $S(x, y) = \left(\sqrt{\frac{2}{\pi}}x, y\right)$

(c) $S(x, y) = \left(x, \frac{2}{\pi}y\right)$ (d) $S(x, y) = \left(x, \frac{\pi}{2}y\right)$

Properties Objective D

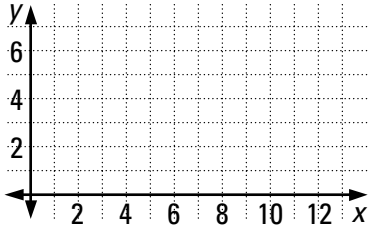
5. The graph of an equation has x-intercepts -1.5, 1, and 2, and y-intercept -3. Give the x- and y-intercepts for the image of the graph under the transformation S: $(x, y) \rightarrow (2x, 3y)$.

6. Describe the points of discontinuity on the image of the graph of $y = [x]$ under the scale change S: $(x, y) \rightarrow \left(2x, \frac{1}{3}y\right)$.

7. Suppose the scale change S: $(x, y) \rightarrow (4x, 3y)$ is applied to the graph of $y = \frac{x}{x^2 - 9}$. What effect does this transformation have on the graph's asymptotes?

Representations Objective K

8. Sketch graphs of $y = \sqrt{x}$ and its image under the transformation S: $(x, y) \rightarrow \left(\frac{1}{4}x, y\right)$.



Name

LESSON MASTER 3-6

Questions on SPUR Objectives
See pages 225–229 for objectives.

Properties Objective E

In 1–4, suppose each element in a data set is multiplied by -7. Describe the effect of this transformation on each measure.

1. mean

2. mode

3. median

4. range

5. A data set is rescaled so that its variance is multiplied by 4. What are two possible values for the scale factor?

Uses Objective I

4. Neil Vestor is trying to decide whether he should purchase stock in an American or a Japanese manufacturing company. He recorded the price of each stock over a 3-week period and computed the mean and standard deviation for each.

	American Company	Japanese Company
Mean stock value	$39.60	¥6734
Standard deviation	$ 2.50	¥ 187

To compare the two stocks, Neil rescales his raw data by converting the stock prices in yen to dollars, using the exchange rate $1 = ¥127. If Neil is trying to minimize his risk by choosing the stock with the least variability, which stock should he buy? Justify your answer.

Name

LESSON MASTER 3-7

Questions on SPUR Objectives
See pages 225–229 for objectives.

Skills Objective A

In 1 and 2, let $f(x) = x^2 + 2x + 7$ and $g(x) = 5x - 3$.

1. Evaluate each composite.

a. $f(g(1))$ _____ **b.** $g(f(1))$ _____

2. Find a formula for each composite.

a. $f(g(x))$ **b.** $g(g(x))$

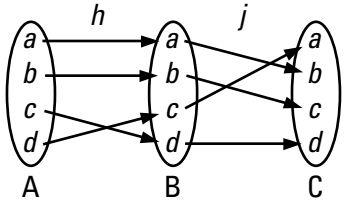
_____ _____

3. Let $F = \{(1, 7), (2, 4), (3, 2), (4, 1)\}$ and $G = \{(7, 6), (1, 3), (2, 2), (4, 1)\}$. Find each composite.

a. $F \circ G$ **b.** $G \circ F$

_____ _____

4. Consider the functions h mapping A to B and j mapping B to C.



Evaluate each composition.

a. $h(j(a))$ _____ **b.** $j(h(b))$ _____ **c.** $(h \circ j)(d)$ _____

Properties Objective G

5. Let $s(x) = \sqrt{x - 1}$ and $n(x) = x^2 - 2$. Give the domain of each composite.

a. $n \circ s$ **b.** $s \circ x$

_____ _____

6. Let $p(t) = \frac{1}{t} - 1$. *True or false.* The domain of p is the same as the domain of $p \circ p$. Justify your answer.

_____

_____

_____

Name _____

LESSON MASTER 3-8

Questions on SPUR Objectives
See pages 225–229 for objectives.

Skills Objective B

In 1–3, a function is described. a. Give an equation for the inverse of the function. b. State whether the inverse is a function.

1. $y = 3 - 2x$ **a.** _____ **b.** _____

2. $g(x) = \frac{1}{x^2}$ **a.** _____ **b.** _____

3. $f = \{(-2.5, 0), (0, -2.5), (1, 3), (3, 1)\}$

a. _____ **b.** _____

Properties Objective G

4. Let $f(x) = \lfloor x \rfloor$ and $g(x) = \lceil x \rceil$. Are functions f and g inverses? Justify your answer.

_____

_____

5. *True or false.* If a function is an even function, then its inverse is not a function. _____

6. Suppose f is a function such that for all x, $f(x) = f(x + 2)$. Is the inverse of f a function? Justify your answer.

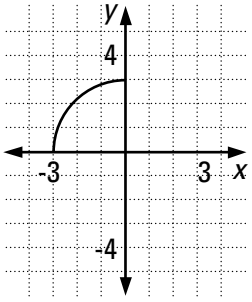
_____

_____

Representations Objectives L and M

In 7–9, determine whether the inverse of the graphed function is a function. If the inverse is a function, sketch its graph on the same set of axes.

7.



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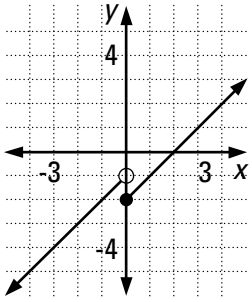

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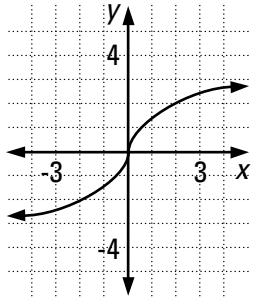

_____ _____ _____