Module 4 Questions: #1, 2, 3, NR 3, 5, 9, 15

Relations and Functions Lesson #12:
Practice Test

1. Which of the following variables is discrete?

   A. The time taken to run 50 metres.
   B. The distance travelled by a train.
   C. The number of animals in a zoo.
   D. The weight of a dog.

2. Which of the following statements is false?

   A. The domain of a relation is associated with values of the independent variable.
   B. The dependent variable is represented by the first coordinate of an ordered pair.
   C. The inputs of a relation are shown on the horizontal axis of a Cartesian Plane.
   D. The range of a relation is represented on the vertical axis of the graph of the relation.

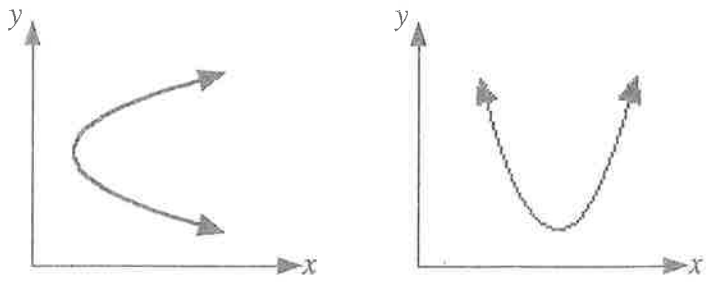
Numerical Response

1. To the nearest hundredth, the positive x-intercept on the graph of the relation $2x^2 + 6y^2 = 7$ is _____ .

(Record your answer in the numerical response box from left to right)

Use the following information to answer the next question.

The graphs of two relations are shown.



3. Which of the following statements is true?

   A. The domains are the same, but the ranges are different.
   B. The ranges are the same, but the domains are different.
   C. The domains are the same, and the ranges are the same.
   D. The domains are different, and the ranges are different.

Numerical Response

2. The graph of the relation $4x^2 - 3y = 12$ has x-intercepts a and b, and y-intercept c. The value of the product abc is _____ .

(Record your answer in the numerical response box from left to right)

Use the following information to answer the next two questions.

The cost ($\$ C$) of publishing a school newspaper is partially fixed and partially depends on the number (n) of newspapers printed. The cost is given by the formula $C = 98 + 0.12n$.

4. The cost of publishing 780 newspapers is

A. \$191.60
B. \$773.76
C. \$94.58
D. \$9 458.00

Numerical Response

3. The domain of the relation can be expressed in the form $n \geq x$, and the range can be expressed in the form $C \geq y$. Write the value of y in the first two boxes, and the value of x in the last two boxes.

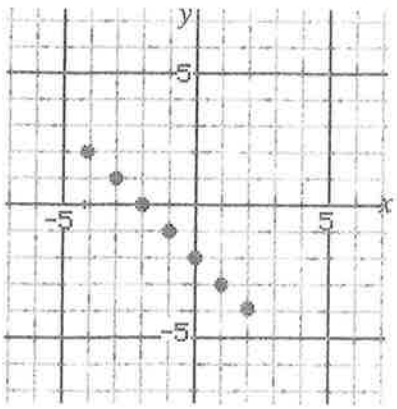
(Record your answer in the numerical response box from left to right)

5. The function $f(x) = 3 - 2x^2$, has domain $\{-6, -4, 0, 2, 5\}$.
Which of the following is an element of the range of the function?

A. 35
B. 27
C. 1
D. –29

Use the following information to answer the next question.

The diagram shows the graph of the function $y = f(x)$.



6. The diagram shows the graph of the function $y = f(x)$.
The value of $f(-2) + f(2)$ is

A. –4
B. –2
C. 0
D. $f(0)$

Use the following information to answer questions #7 and #8.

Consider the function $P(x) = 5x + 2$.

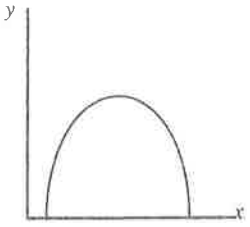
7. The value of $P(6)$ is

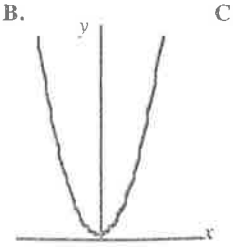
A. $\frac{8}{5}$
B. $\frac{4}{5}$
C. 32
D. 58

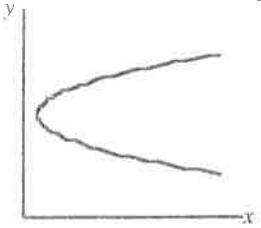
8. If $P(b) = 6$, then $b =$

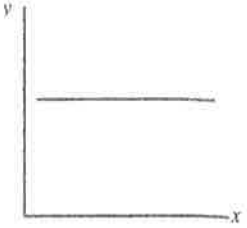
A. $\frac{8}{5}$
B. $\frac{4}{5}$
C. $\frac{5}{4}$
D. 32

9. Which of the following diagrams shows a relation which is not a function?

A. 

B. 

C. 

D. 

10. Consider the graph of the function $f(x) = 4x - 10$. The x-intercept of the graph of f is

A. -10
B. -2.5
C. 2.5
D. 10

11. Given a function g defined by $g(x) = px + q$ with $g(0) = 2$ and $g(1) = 3$ then

A. $p = 1,\ q = 0$
B. $p = 3,\ q = 2$
C. $p = 1,\ q = 2$
D. $p = 3,\ q = 0$

12. If $f(x) = 3^x$ and $f(-a) = \dfrac{1}{81}$, then $a =$

A. 4
B. -4
C. $-\dfrac{1}{4}$
D. $\dfrac{1}{4}$

13. If $g(x) = \dfrac{2}{3}x + 6$, an expression for $g(2x - 1)$ is

A. $\dfrac{4}{3}x + 5$
B. $\dfrac{4}{3}x + \dfrac{16}{3}$
C. $\dfrac{4}{3}x + 11$
D $\dfrac{8}{3}x + 5$

14. Consider the following functions:

1. $p(x) = x^2 - 4x - 2$ **2.** $p(x) = \frac{1}{3}x + 14$ **3.** $p(x) = 3x^2 + x$ **4.** $p(x) = 7 - 5x$

For each function evaluate $p(-3)$, and put the expressions in order from greatest to least. The order is

A. 4312
B. 3412
C. 3124
D. none of the above

Numerical Response **4.** If $f(x) = 1 - 2x - 5x^2$, and if $f(x + 2)$ is written in the form $ax^2 + bx + c$, the value of $a - b - c$ is _____ .

(Record your answer in the numerical response box from left to right)

Numerical Response **5.** $f(a) = \frac{a}{a + 4}$. The exact value of $f(5) - f(5^{-1})$ written as a rational number in simplest form is $\frac{p}{q}$. The value of p is _____ .

(Record your answer in the numerical response box from left to right)

15. Which of the following cannot be used to represent a function?

A. Graph
B. Table of Values
C. Ordered Pairs
D. Coordinate

Written Response - 5 marks

1. During an airshow, the path of a stunt dive of a jet can be modelled by the equation $h = t^2 - 9t + 81$, where h is the height in metres after t seconds. The end of the stunt occurs when the plane achieves its starting height.

- How high is the jet at the start of the dive?
- How high is the jet above ground level at its lowest point?
- When does the jet reach its lowest point in the dive?
- How high is the jet two seconds into its dive?
- After how many seconds does this height occur again within the jet's stunt dive?

Assignment Key

1. C **2.** B **3.** D **4.** A **5.** D **6.** A **7.** C **8.** B

9. C **10.** C **11.** C **12.** A **13.** B **14.** B **15.** D

1. | 1 | . | 8 | 7 |

2. | 1 | 2 | | |

3. | 9 | 8 | 0 | 0 |

4. | 4 | 0 | | |

5. | 3 | 2 | | |

Written Response

1.
- 81 m
- 60.75 m
- 4.5 sec
- 67 m
- 7 sec

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   C. The inputs of a relation are shown on the horizontal axis of a Cartesian Plane.
   D. The range of a relation is represented on the vertical axis of the graph of the relation.

Numerical Response

1. To the nearest hundredth, the positive x-intercept on the graph of the relation $2x^2 + 6y^2 = 7$ is _____ .

(Record your answer in the numerical response box from left to right)

1	.	8	7

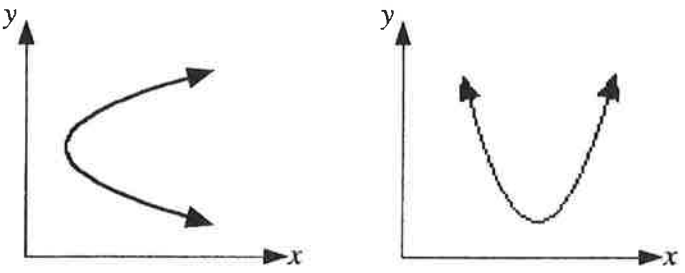
$y = 0 \qquad 2x^2 = 7$

$x^2 = \frac{7}{2}$

$x = \sqrt{\frac{7}{2}} = 1.87$

Use the following information to answer the next question.

The graphs of two relations are shown.



3. Which of the following statements is true?

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   B. The ranges are the same, but the domains are different.
   C. The domains are the same, and the ranges are the same.
   D. The domains are different, and the ranges are different.

Numerical Response **2.** The graph of the relation $4x^2 - 3y = 12$ has x-intercepts a and b, and y-intercept c. The value of the product abc is _____ .

(Record your answer in the numerical response box from left to right)

1	2		

x-intercepts

$y = 0$

$4x^2 = 12$

$x^2 = 3$

$x = \pm\sqrt{3}$

y-intercept

$x = 0$

$\frac{-3y}{-3} = \frac{12}{-3}$

$y = -4$

$abc = (\sqrt{3})(-\sqrt{3})(-4)$

$= 12$

Use the following information to answer the next two questions.

The cost ($\$ C$) of publishing a school newspaper is partially fixed and partially depends on the number (n) of newspapers printed. The cost is given by the formula $C = 98 + 0.12n$.

4. The cost of publishing 780 newspapers is

A. $191.60
B. $773.76
C. $94.58
D. $9 458.00

$C = 98 + 0.12(780)$

$= 191.6$

Numerical Response **3.** The domain of the relation can be expressed in the form $n \geq x$, and the range can be expressed in the form $C \geq y$. Write the value of y in the first two boxes, and the value of x in the last two boxes.

(Record your answer in the numerical response box from left to right)

9	8	0	0

$n \geq 0$ $C \geq 98$

5. The function $f(x) = 3 - 2x^2$, has domain $\{-6, -4, 0, 2, 5\}$.
Which of the following is an element of the range of the function?

A. 35
B. 27
C. 1
D. −29

$3 - 2(-6)^2 = -69$

$3 - 2(-4)^2 = -29$

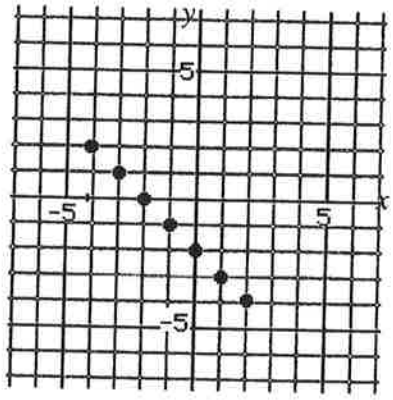
$3 - 2(0)^2 = 3$

$3 - 2(2)^2 = -5$

$3 - 2(5)^2 = -47$

Use the following information to answer the next question.

The diagram shows the graph of the function $y = f(x)$.



6. The diagram shows the graph of the function $y = f(x)$.
The value of $f(-2) + f(2)$ is

A. -4
B. -2
C. 0
D. $f(0)$

$f(-2) = 0 \quad f(2) = -4$

$0 + (-4) = -4$

Use the following information to answer questions #7 and #8.

Consider the function $P(x) = 5x + 2$.

7. The value of $P(6)$ is

A. $\frac{8}{5}$
B. $\frac{4}{5}$
C. 32
D. 58

$P(6) = 5(6) + 2$

$= 32$

8. If $P(b) = 6$, then $b =$

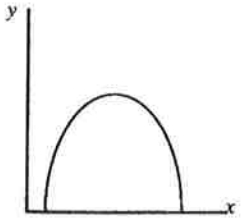
A. $\frac{8}{5}$
B. $\frac{4}{5}$
C. $\frac{5}{4}$
D. 32

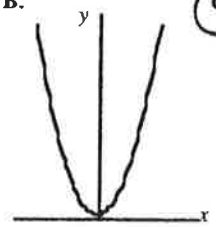
$P(b) = 5b + 2 = 6$

$5b = 4$

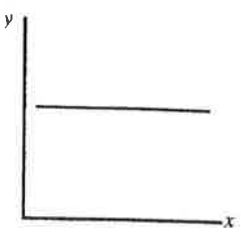
$b = \frac{4}{5}$

9. Which of the following diagrams shows a relation which is not a function?

A. 

B. 

C. 

D. 

10. Consider the graph of the function $f(x) = 4x - 10$. The x-intercept of the graph of f is

A. -10 x_{int} $f(x) = 0$ $0 = 4x - 10$

B. -2.5 $10 = 4x$

C. 2.5 $x = 2.5$

D. 10

11. Given a function g defined by $g(x) = px + q$ with $g(0) = 2$ and $g(1) = 3$ then

A. $p = 1,\ q = 0$ $2 = (p)(0) + q$ $q = 2$

B. $p = 3,\ q = 2$ $3 = (p)(1) + q$ $p + q = 3$

C. $p = 1,\ q = 2$ $p + 2 = 3$ $p = 1$

D. $p = 3,\ q = 0$

12. If $f(x) = 3^x$ and $f(-a) = \frac{1}{81}$, then $a =$

A. 4 $3^{-a} = \frac{1}{81}$ $81 = 3^a$

B. -4 $a = 4$

C. $-\frac{1}{4}$ $\frac{1}{3^a} = \frac{1}{81}$

D. $\frac{1}{4}$

13. If $g(x) = \frac{2}{3}x + 6$, an expression for $g(2x - 1)$ is

$g(2x-1) = \frac{2}{3}(2x-1) + 6$

$= \frac{4}{3}x - \frac{2}{3} + 6$

$= \frac{4}{3}x + \frac{16}{3}$

A. $\frac{4}{3}x + 5$

B. $\frac{4}{3}x + \frac{16}{3}$

C. $\frac{4}{3}x + 11$

D $\frac{8}{3}x + 5$

14. Consider the following functions:

1. $p(x) = x^2 - 4x - 2$ **2.** $p(x) = \frac{1}{3}x + 14$ **3.** $p(x) = 3x^2 + x$ **4.** $p(x) = 7 - 5x$

For each function evaluate $p(-3)$, and put the expressions in order from greatest to least. The order is

A. 4312
B. 3412
C. 3124
D. none of the above

1. $p(-3) = (-3)^2 - 4(-3) - 2 = 19$
2. $p(-3) = \frac{1}{3}(-3) + 14 = 13$
3. $p(-3) = 3(-3)^2 + (-3) = 24$
4. $p(-3) = 7 - 5(-3) = 22$

Numerical Response **4.** If $f(x) = 1 - 2x - 5x^2$, and if $f(x+2)$ is written in the form $ax^2 + bx + c$, the value of $a - b - c$ is _____ .

(Record your answer in the numerical response box from left to right)

4	0		

$f(x+2) = 1 - 2(x+2) - 5(x+2)^2$

$= 1 - 2x - 4 - 5(x^2 + 4x + 4)$

$= 1 - 2x - 4 - 5x^2 - 20x - 20$

$= -5x^2 - 22x - 23$

$a = -5$, $b = -22$, $c = -23$

$a - b - c$

$= -5 - (-22) - (-23)$

$= 40$

Numerical Response **5.** $f(a) = \frac{a}{a+4}$. The exact value of $f(5) - f(5^{-1})$ written as a rational number in simplest form is $\frac{p}{q}$. The value of p is _____ .

(Record your answer in the numerical response box from left to right)

3	2		

$f(5) = \frac{5}{5+4} = \frac{5}{9}$ $\quad f(5^{-1}) = \frac{5^{-1}}{5^{-1}+4} = \frac{\frac{1}{5}}{\frac{1}{5}+4} = \frac{1}{21}$

$\frac{5}{9} - \frac{1}{21} = \frac{32}{63}$

$p = 32$

15. Which of the following cannot be used to represent a function?

A. Graph
B. Table of Values
C. Ordered Pairs
D. Coordinate

Written Response - 5 marks

1. During an airshow, the path of a stunt dive of a jet can be modelled by the equation $h = t^2 - 9t + 81$, where h is the height in metres after t seconds. The end of the stunt occurs when the plane achieves its starting height.

- How high is the jet at the start of the dive?

  $t = 0 \quad h = 81$ 81 m

- How high is the jet above ground level at its lowest point?

  Use "minimum" feature. y-coord 60.75 m

- When does the jet reach its lowest point in the dive?

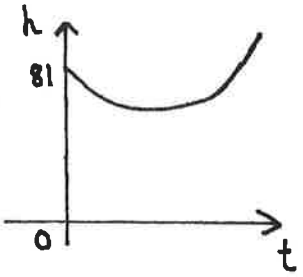
  x-coord of minimum point After 4.5 sec

- How high is the jet two seconds into its dive?

  $x = 2$ 67 m

- After how many seconds does this height occur again within the jet's stunt dive?

graph $y = x^2 - 9x + 81$



graph $y_2 = 67$ "intersect"

7 seconds

Assignment Key

1. C **2.** B **3.** D **4.** A **5.** D **6.** A **7.** C **8.** B

9. C **10.** C **11.** C **12.** A **13.** B **14.** B **15.** D

1. | 1 | . | 8 | 7 |

2. | 1 | 2 | | |

3. | 9 | 8 | 0 | 0 |

4. | 4 | 0 | | |

5. | 3 | 2 | | |

Written Response

1. • 81 m

- 60.75 m
- 4.5 sec.
- 67 m
- 7 sec.