Answer Key for RSG's Secondary 3 Honors

2.6H_RSG

READY

1 a. linear

b. $f(-3) = -23$;

$f(x) = f(x-1) + 6$

2 a. quadratic

b. $f(-3) = 4$;

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

3 a. linear

b. $f(-3) = -15$;

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

4 a. linear

b. $f(-3) = 24$;

$f(x) = f(x-1) - 2$

5 a. quadratic

b. $f(-3) = 48$;

$f(x) = f(x-1) + (10x - 6)$

6 a. quadratic

b. $f(-3) = 4$;

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

SET

7 a. \$16,776

b. \$16,991

c. \$ 17,103

d. \$17,216

e. \$17,217.22

8 a. \$801,423

b. \$893,815

c. \$946,916

d. \$1,004,799.01

e. \$1,005,472.99

9 a)

x	$f(x) = 2^x$
-2	$\mathbf{1/4}$
-1	$\mathbf{1/2}$
0	**1**
1	**2**
2	**4**

b)

x	$g(x) = 4^x$
-2	$\mathbf{1/16}$
-1	$\mathbf{1/4}$
0	**1**
1	**4**
2	**16**

c)

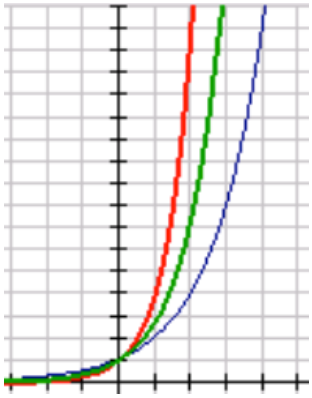
x	$h(x) = e^x$
-2	$\mathbf{1/e^2 \approx 0.1353}$
-1	$\mathbf{1/e \approx 0.3679}$
0	**1**
1	$\boldsymbol{e \approx 2.7183}$
2	$\boldsymbol{e^2 \approx 7.3891}$

graph

$f(x) = 2^x$ *blue*

$g(x) = 4^x$ *red*

$h(x) = e^x$ *green*



10. Point (0,1) ; Any number raised to the zero power equals one.

11. a) $f(x) < h(x) < g(x)$

b) $g(x) < h(x) < f(x)$

GO

12. $7^0 = 1$

13. $a^0 = 1$

14. $6^1 = 6$

15. $log_a a = 1$ because $a^1 = a$

16. $log_4 4^x = x$ *because* $4^x = 4^x$

17. $log_a a^x = x$ *because* $a^x = a^x$

18. x = y

19. = 81 because $log_3 81$ equals the exponent u that make $3^u = 81$

20. $= x$ because $log_a x$ equals the exponent u that make $a^u = x$

2.7H_RSG

READY

1.

x	$y = x^1$
-3	**-3**
-2	**-2**
-1	**-1**
0	**0**
1	**1**
2	**2**
3	**3**

2.

x	$y = x^2$
-3	**9**
-2	**4**
-1	**1**
0	**0**
1	**1**
2	**4**
3	**9**

2.7H_RSG continued

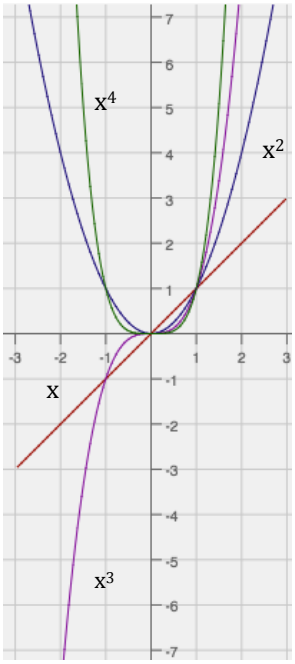
3.

x	$y = x^3$
-3	**-27**
-2	**-8**
-1	**-1**
0	**0**
1	**1**
2	**8**
3	**27**

4.

x	$y = x^4$
-3	**81**
-2	**16**
-1	**1**
0	**0**
1	**1**
2	**16**
3	**81**

5.



6. The table and the graph both indicate two points in common (0,0) and (1,1). Logical because 0 raised to any positive power is still 0 and 1 raised to any power is 1.

7. The graphs of even powers are in quadrants 1 & 2 or always positive. The graphs of odd powers are in quad. 1 & 3. Even reflect across y-axis
Odd reflect about the origin, <u>if the function has NOT been translated)</u>

SET

8.

time (hours)	#bacteria
0	**7**
1	**112**
2	**1792**
3	**28672**
4	**458752**
5	**7340032**

Equation: $y = 7 * 2^{(4x)}$
Graph:
x-scale 1 hour;
y-scale 5000 bacteria

9. 10000: 2.5 and 2.75 hours
1000000: 4.25 and 4.5 hours
10. 5.5×10^{29}
11. $t = \frac{log_2 100}{4}$
12. 1.661 hours

GO

13. -0.2
14. -0.8
15. -0.1
16. -0.6
17. 3.18
18. 3B
19. -0.2
20. A + C – B

2.8H_RSG

READY

1. 100
2. 7
3. 27
4. 4
5. 7
6. 131
7. 71
8. 3

SET

9. b
10. a
11. c
12. a
13. b
14. a
15. b
16. c
17. b
18. $log_5\sqrt{50} = 1 + log_5\sqrt{2}$
19. $log_2\frac{32}{4} = log_2 32 - log_2 4$
20. $log\sqrt{90} = log3 + \frac{1}{2}$
21. all 3 are equal

GO

22. 5;
23. -3;
24. -1
25. -7;
26. 19;
27. 4
28. -3;
29. -2;
30. $\frac{16}{5}$

2.9H_RSG

READY

1. -2, 1
2. 3
3. 1
4. 0, 2, -2
5. $a)$ $y = log_2 x$; Reasons may vary. The curve looks logarithmic. The 3 points (1,0), (2,1), (4,2) suggest base 2.

2.9H_RSG continued

b) $y = x^2 + x - 2$; Reasons may vary. Since x = -2 and 1, the factors (x+2)(x-1) will generate a possible equation. The y-intercept -2 confirms the exact equation.

c) $y = x^3 - 4x$; Reasons may vary. The x-intercepts and the max and min confirm the equation.

d) $y = 2x - 6$; Reasons may vary. Slope = 2, Point (3,0)

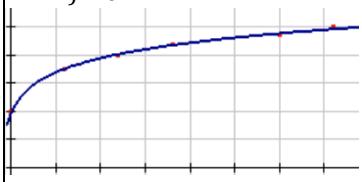
6. Answers may vary. The x-intercepts can be used to generate factors for the equations. They also indicate the degree of the function.

SET

7. 4
8. 5, -5
9. 4, -5
10. 8
11. 4
12. 3, 4
13. $^1/_4$
14. $^{12}/_5$
15. $3\,^1/_2$ *or* $^7/_2$
16. $\frac{log(8)+1}{2}$ *or* ≈ 0.9515
17. 10
18. $^2/_7$
19. a. 50,118,723.36
    b. 7,943,282.35
    c. $\frac{50118723.36}{7943282.35} \approx 6.3$

GO

20. 4,3,5,2,1
21. 4,2,1,3,5
22. a) $log_3 729 = 6$
    b) $log_5 0.04 = -2$
    c) $log_{(4/5)}\left(\frac{7}{4}\right) = -1$
23. a) $6^3 = 216$
    b) $9^0 = 1$
    c) $2^{-1} = 0.5$
24. $1 + 3log_4 x$
25. $\frac{1}{2}(log_5 m - log_5 n)$
26. $2 + log_3 w - log_3 x - log_3 y - log_3 z$
27. a) 4
    b) 7
    c) 8
    d) 9
    e) 9
    f) 10

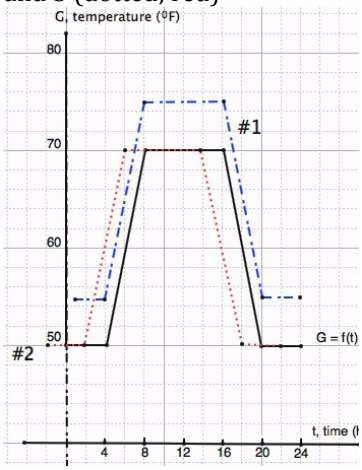


4.7H_RSG

6.14H_RSG

READY

Graphs for 1 (dash/dot; blue) and 3 (dotted; red)



2. $G_J = f(t) + 5$
4. $G_S = f(t - 2)$

SET

5. 20
6. 62
7. 36
8. 81
9. 18
10. 45
11. $\frac{3\pi}{8}$
12. $\frac{\pi}{12}$
13. $\frac{\pi}{5}$
14. a) $\frac{\sqrt{7}}{12}$ b) $\frac{3}{\sqrt{7}} = \frac{3\sqrt{7}}{7}$
15. a) $\frac{5}{13}$ b) $\frac{5}{12}$ c) $\frac{5}{13}$
16. $\frac{\sin\theta}{\cos\theta} \cdot \frac{\cos\theta}{1} = sin\theta$
17. $(1 + \cos\beta)(1 - \cos\beta) = 1 - cos\,\beta^2 = sin^2\beta = 1 = sin^2\beta + cos\,\beta^2; pythag\ ID$
18. Do the same as 17.
19. Replace $cos^2 W$ with $(1 + sin^2 W; simplify)$
20. Multiply to get $cos^2 x - sin^2 x$ *double angle ID*
21. Add to get $2 \sin u \cos u$ *double angle ID*

GO

22. $30°, 150°, \frac{\pi}{6}, \frac{5\pi}{6}$
23. $210°, 330°, \frac{7\pi}{6}, \frac{11\pi}{6}$
24. $45°, 315°, \frac{\pi}{4}, \frac{7\pi}{4}$
25. $240°, 300°, \frac{4\pi}{3}, \frac{5\pi}{3}$
26. $135°, 315°, \frac{3\pi}{4}; \frac{7\pi}{4}$
27. $60°, 240°, \frac{\pi}{3}, \frac{5\pi}{3}$

6.15H_RSG

READY

1. 10 *units*
2. $\sqrt{61}$ *units*
3. $7\sqrt{2}$ *units*
4. 5 *units*
5. $\sqrt{10}$ *units*
6. 4 *units*

SET

7. 0.175 *radians*
8. 1.693 *radians*
9. 4.8 *radians*
10. 3.508 *radians*
11. 0 *radians*
12. 3.334 *radians*
13. 2.706 *radians*
14. 5.847 *radians*
15. 2.356 *radians*
16. 4.712 *radians*
17. Both sine and cosine equal 1 and -1 in one location.

6.15H_RSG continued

GO

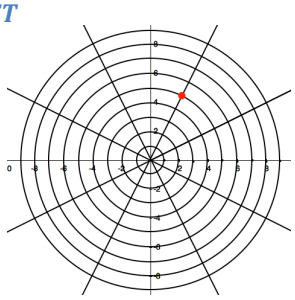
18. 7.85 in
19. 10.47 cm
20. 28.27 ft
21. 3.08 mm

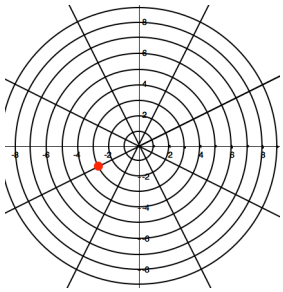
6.16_RSG

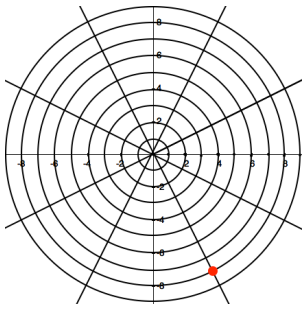
READY

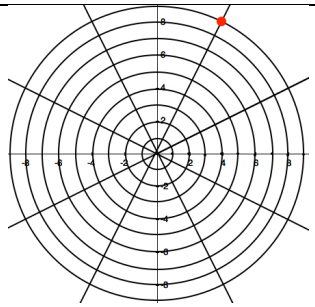
1. 0.3143 *radians*
2. 0.6429 *radians*
3. 1.697*radians*
4. 2 *radians*

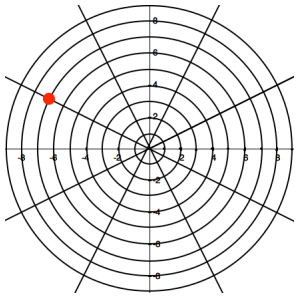
SET

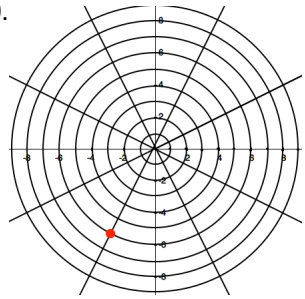
5. 

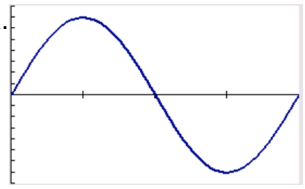
6. 

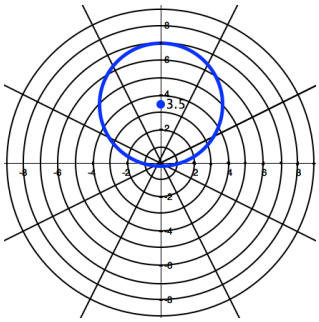
7. 

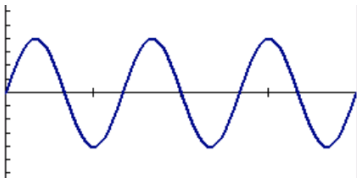
8. 

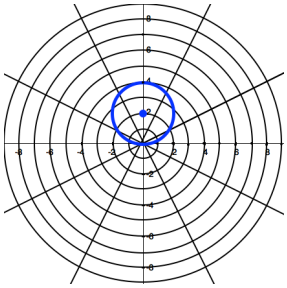
9. 

10. 

11. 

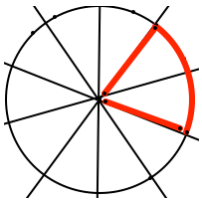
12. 

13. 

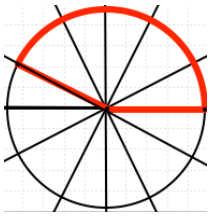
14. 

GO

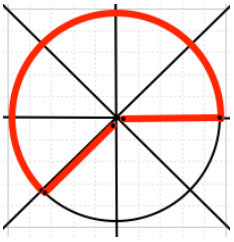
15. 141.37 m²



16. 1116.10 m²



17. 2010.62 mm²



6.16H_RSG Part 2

READY

1. (-3, 4)
2. (5, 2)
3. (1, -6)
4. red 5. green 6. blue 7. brown

8. *1)* 5 *2)* $\sqrt{29}$ *3)* $\sqrt{37}$ *4)* $\sqrt{34}$ *5)* $2\sqrt{5}$ *6)* $\sqrt{37}$ *7)* $\sqrt{5}$

SET

9. (0, 4)
10. $\left(\frac{3}{2}, \frac{\sqrt{3}}{2}\right)$
11. (-2, 0)
12. (5, -5)
13. $\left(3\sqrt{2}, \frac{3\pi}{4}\right)$
14. (-6, π)
15. $\left(2, \frac{\pi}{3}\right)$
16. $\left(8, \frac{7\pi}{6}\right)$
17. $\sqrt{10}(\cos 3.46 + i\ sin\ 3.46)$
18. $3\sqrt{2}\left(\cos\frac{7\pi}{4} + i\sin\frac{7\pi}{4}\right)$
19. $\sqrt{65}(\cos 2.62 + i\ sin\ 2.62)$
20. $2\left(\cos\frac{\pi}{6} + i\sin\frac{\pi}{6}\right)$
21. $-\frac{3}{2} + \frac{3\sqrt{3}}{2}i$
22. $-\frac{5\sqrt{2}}{2} + \frac{5\sqrt{2}}{2}i$
23. $2 - 2i$
24. $8i$

GO

25. $16 + 5i$
26. $7 - 11i$
27. $-6 + 9i$
28. $-16 - 2i$
29. $6 + 2i$
30. 61

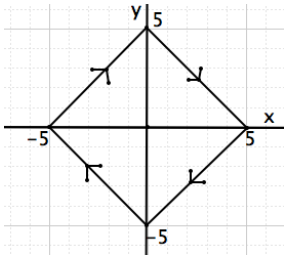
7.7H_RSG

READY

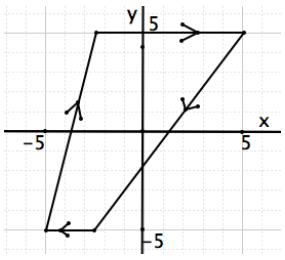
1. $y = 4x - 11$
2. $y = -5x - 7$
3. $y = \frac{1}{2}x - \frac{23}{2}$
4. $y = -\frac{2}{3}x + \frac{8}{3}$
5. $y = \frac{2}{5}x - \frac{7}{5}$
6. $y = \frac{3}{4}x + \frac{5}{4}$

SET

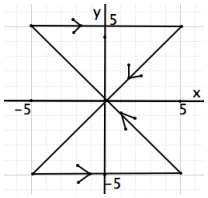
7. Motion: Lines from (0, 5) to (5, 0) to (-5, 0) to (0, -5)



8. Motion: Lines from (-2.5, 5) to (5, 5) to (-2.5, -5) to (-5, -5) to (-2.5, 5)



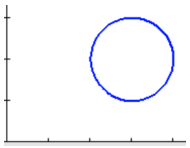
9. Motion: Lines from (-5, 5) to (5, 5) to (-5, -5) to (5, -5) to (-5, 5)



10. table

T	X1T	Y1T
0	3	3
1	3.8415	2.5403
2	3.9093	1.5839
3	3.1411	1.01
4	2.2432	1.3464
5	2.0411	2.2837
6	2.7206	2.9602
7	3.657	2.7539

graph:

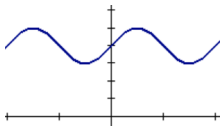


equation:

$(x - 3)^2 + (y - 2)^2 = 1$

GO

11.



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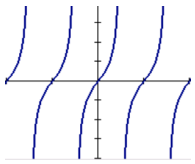

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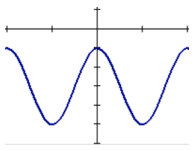

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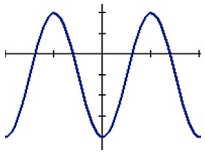


7.8H_RSG

READY

1. mean 85.75, median 85, mode 85
2. Many possible answers; Example: Only one of the y-values is actually 4. All of the rest are either more than 4 or less than 4. If the distance of each point above the y = 4 line is considered positive and the distance of each point below the line is considered negative, those distances will cancel each other out.

SET

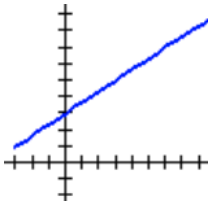
3. Table:

T	X1T	Y1T
0	-3	1
1	0	3
2	3	5
3	6	7
4	9	9
5	12	11
6	15	13

Rectangular equation:

$y = \frac{2}{3}x + 1$

Graph:



Motion: Beginning at (-3, 1) moves up to the right in a line

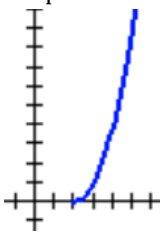
4. Table:

T	X1T	Y1T
0	2	0
1	3	1
2	4	4
3	5	9
4	6	16
5	7	25
6	8	36

Rectangular equation:

$y = (x - 2)^2$

Graph:



Motion: Beginning at (2, 0) moves up to the right in a parabolic curve

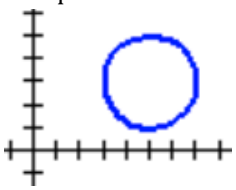
5. Table:

T	X1T	Y1T
0	7	3
1	6.0806	4.6829
2	4.1677	4.8186
3	3.02	3.2822
4	3.6927	1.4864
5	5.5673	1.0822
6	6.9203	2.4412

Rectangular Equation:

$(x - 5)^2 + (y - 3)^2 = 4$

Graph:



Motion: Moves counter-clockwise beginning at (7, 3)

GO

10. a) $14 - 3x^2$
    b) $-9x^2 - 12x$
    c) -34
    d) -12

11. No; there are no values of x that make the equations undefined.

12. a) $\frac{9x+11}{3x+2}$
    b) $\frac{12x+3}{x-1}$
    c) $\frac{101}{32}$
    d) $\frac{51}{3} = 17$

13. Yes;
    a) $x \neq 1, -\frac{2}{3}$
    b) $x \neq 1$

The numbers 10 and 4 are not values that would make the functions undefined, so there are no restrictions on c) or d).