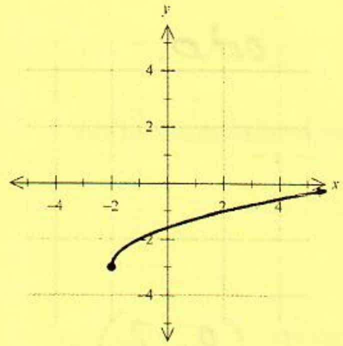
Name: Key Period:

SM2H Quarter 1 Review (Units 1 and 2)

Find the domain and range of each function.

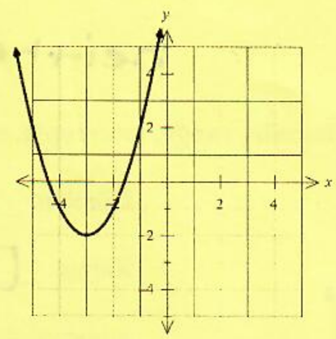
1.



Domain: $[-2, \infty)$

Range: $[-3, \infty)$

2.



Domain: $(-\infty, \infty)$

Range: $[-2, \infty)$

3. Posers is a modelling agency that specializes in providing multi-media exposure for its clients. Models who sign with this firm must sign an exclusive contract for a minimum of two years. The maximum length of time for a contract is five years. Posers charges $2,499.00 per year for their services. The rate is applied even if a client breaks the contract after part of a year. There is a one-time $49.99 signing fee.

   a. What unit does the real world domain represent? time

   b. What unit does the real world range represent? cost

   c. What is the real world domain? $[2, 5]$

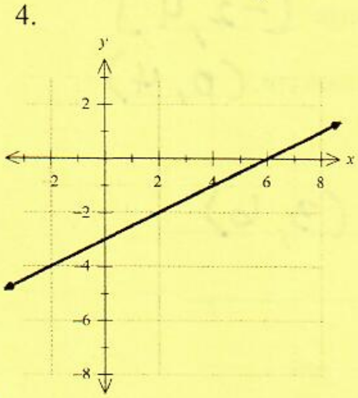
   d. What is the real world range? [$5047.99, $12544.99]

$f(2) = 49.99 + 2499(2)$

$f(5) = 49.99 + 2499(5)$

Find the intercepts of the given functions visually or algebraically. Write your answers as ordered pairs. You must show all your work for full credit.

4.



x-intercept: $(6, 0)$

y-intercept: $(0, -3)$

5. $4x - 9y = 36$

$\frac{4x}{4} - 9(0) = \frac{36}{4}$

$x = 9$

$4(0) - \frac{9y}{-9} = \frac{36}{-9}$

$y = -4$

x-intercept: $(9, 0)$

y-intercept: $(0, -4)$

Determine algebraically the type of symmetry for each of the following functions. Show all your work!

9. $f(x) = x^2$

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

$f(-x) = f(x)$

even

10. $g(x) = 3x + 6$

$g(-x) = 3(-x) + 6 = -3x + 6$

$g(-x) \neq g(x)$

$g(-x) \neq -g(x)$

neither

11. $h(x) = 2x$

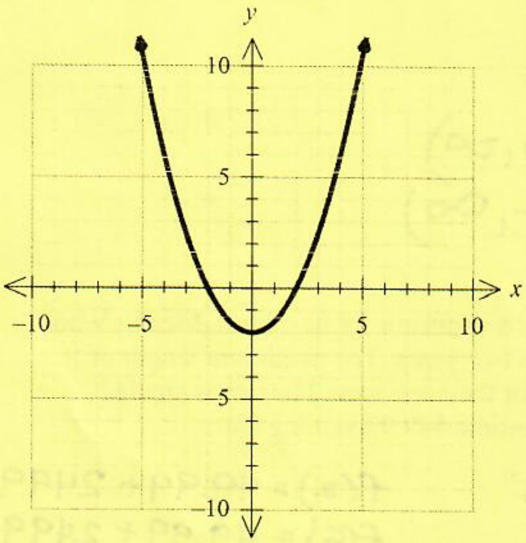
$h(-x) = 2(-x) = -2x$

$h(-x) = -h(x)$

odd

Use the graph to find the domain, range, intercepts, and the relative maximum or minimum of the function.

12.



Domain: $(-\infty, \infty)$

Range: $[-2, \infty)$

x-intercepts: $(-2, 0)$ $(2, 0)$ y-intercept: $(0, -2)$

Increasing: $(0, \infty)$

Decreasing: $(-\infty, 0)$

Positive: $(-\infty, -2) \cup (2, \infty)$

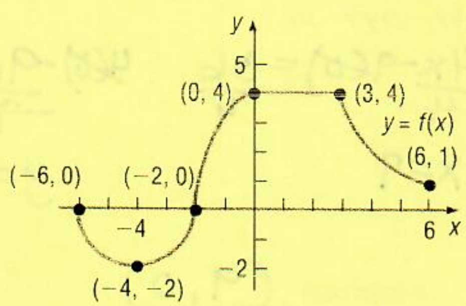
Negative: $(-2, 2)$

Maximum/Minimum point(s): $(0, -2)$

Maximum/Minimum value(s): -2

Use the graph to find the intervals where the function is increasing, decreasing, constant, positive, and negative.

14.



Domain: $[-6, 6]$ Range: $[-2, 4]$

x-intercepts: $(-6, 0)$ $(-2, 0)$ y-intercept: $(0, 4)$

Increasing: $(-4, 0)$

Decreasing: $(-6, -4) \cup (3, 6)$

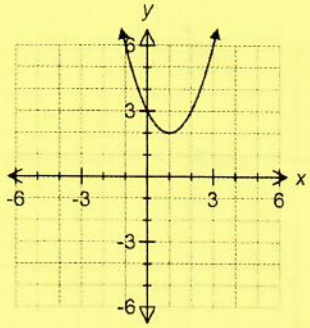
Constant: $(0, 3)$

Positive: $(-2, 6]$

Negative: $(-6, -2)$

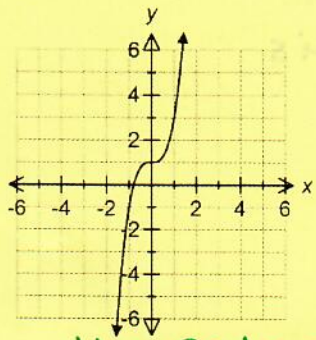
Find the end behavior of each function based on its graph. Write the answers as limits.

15.



$\lim_{x\to-\infty} f(x) = \infty$ $\lim_{x\to\infty} f(x) = \infty$

16.



$\lim_{x\to-\infty} f(x) = -\infty$ $\lim_{x\to\infty} f(x) = \infty$

For each function, identify the parent graph ($y=\sqrt{x}$, $y=x^2$, or $y=|x|$), then list the transformations needed to get from the parent graph to the final graph. Make sure to list the transformations in the order in which they should be applied.

17. $y = 2|x+1| - 6$
Parent: $y=|x|$
Transformations:
1. vertical stretch of 2
2. shift left 1
3. shift down 6

18. $y = -3\sqrt{x} + 2$
Parent: $y=\sqrt{x}$
Transformations:
1. reflect over x-axis
2. vertical stretch of 3
3. up 2

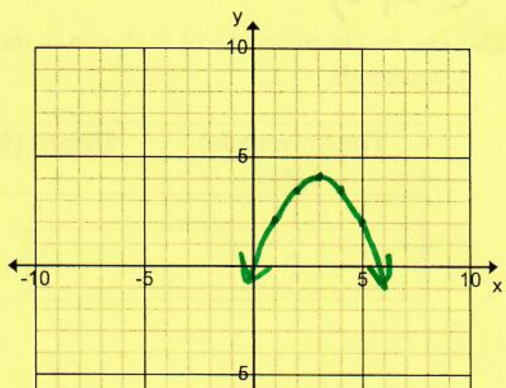
19. $y = 2(x+1)^2 + 4$
Parent: $y=x^2$
Transformations:
1. vertical stretch of 2
2. shift left 1
3. shift up 4

Use transformations to graph each function. Create a table that clearly shows the original points and the transformations that will be applied. Graph the final transformed function on the grid provided. State the vertex or starting point and the domain and range.

20. Graph this function: $g(x) = -\frac{1}{2}(x-3)^2 + 4$

List Transformations in order here:

reflect over x-axis
vertical shrink of 1/2
shift right 3
shift up 4



Tables:

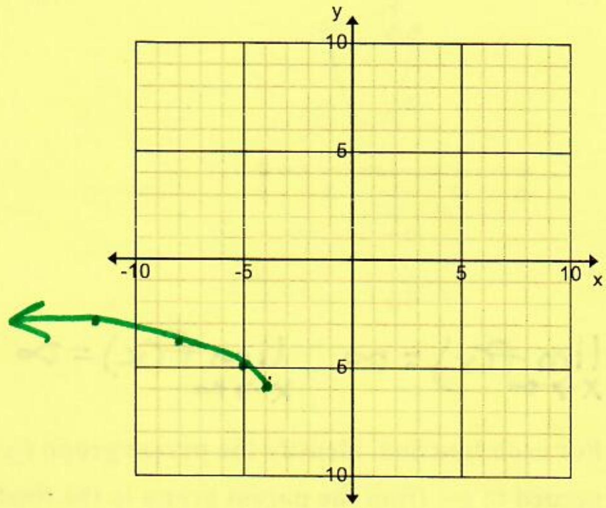
+3	x	$y=x^2$	·-1	·1/2	+4
1	-2	4	-4	-2	2
2	-1	1	-1	-1/2	3.5
3	0	0	0	0	4
4	1	1	-1	-1/2	3.5
5	2	4	-4	-2	2

Domain: $(-\infty, \infty)$ Range: $(-\infty, 4]$ Vertex: $(3, 4)$

21. Graph this function: $f(x)=\sqrt{-(x+4)}-6$

List Transformations in order here:

reflect over y-axis
shift left 4
shift down 6



Tables:

-4	•-1	x	$y=\sqrt{x}$	-6
-4	0	0	0	-6
-5	-1	1	1	-5
-8	-4	4	2	-4
-13	-9	9	3	-3

Domain: $(-\infty, -4]$ Range: $[-6, \infty)$ Endpoint: $(-4,-6)$

Find the average rate of change for each function on the specified interval. Show your work!

24. $f(x)=|x-3|-2$, on $[-2,4]$

$f(-2)=|-2-3|-2$
$=|-5|-2$
$=5-2$
$=3$
$(-2,3)$

$f(4)=|4-3|-2$
$=|1|-2$
$=1-2$
$=-1$
$(4,-1)$

$m=\frac{-1-3}{4--2}=\frac{-4}{6}$
$=\boxed{-\frac{2}{3}}$

25. The height of an object is shown in the table. Find the average rate of change from 1-3 seconds.

Time (seconds)	Height (feet)
0	1
1	8
2	18
3	32

$(1,8), (3,32)$

$m=\frac{32-8}{3-1}=\frac{24}{2}=\boxed{12 \text{ ft/s}}$

26. Write a complete sentence explaining what your answer means.

The object rose an average of 12 feet per second from 1 to 3 seconds.

Simplify the following expressions. Your answers should contain only positive exponents.

1. $\frac{15x^{-2}y^4z^5}{12x^6y^{-1}z^{10}}$

$\boxed{\frac{5y^5}{4x^8z^5}}$

2. $\left(\frac{3p^{-2}q^3}{6p^6q}\right)^{-2}$

$\frac{3^{-2}p^4q^{-6}}{6^{-2}p^{-12}q^{-2}} = \frac{6^2p^{16}}{3^2q^4}$

$= \boxed{\frac{4p^{16}}{q^4}}$

3. $\left(\frac{a^2}{b^3}\right)^{-\frac{1}{2}}$ $= \frac{a^{-1}}{b^{-3/2}} = \boxed{\frac{b^{3/2}}{a}}$

Simplify each radical expression.

4. $\sqrt[3]{54x^4y^3}$

9 6

3 3 3 2

$\boxed{3xy\sqrt[3]{2x}}$

5. $15\sqrt{28p^7q^6}$

4 7

2 2

$\boxed{30p^3q^3\sqrt{7p}}$

6. $\sqrt{-60}$

$i\sqrt{60}$

6 10

2 3 2 5

$\boxed{2i\sqrt{15}}$

Rewrite using rational exponents, use the rules of exponents to simplify, then write your answer in radical form.

7. $\sqrt[5]{\sqrt[4]{x^8}}$

$((x^8)^{1/4})^{1/5} = x^{8/20} = x^{2/5}$

$= \boxed{\sqrt[5]{x^2}}$

8. $\sqrt[5]{t^4} \cdot \sqrt[6]{t^7}$

$t^{4/5} \cdot t^{7/6} = t^{59/30} = \boxed{\sqrt[30]{t^{59}}}$

Add or subtract and simplify.

9. $2\sqrt{45} - 6\sqrt{3} + 15\sqrt{80}$

9 5 8 10

3 3 4 2 2 5

2 2

$6\sqrt{5} - 6\sqrt{3} + 60\sqrt{5}$

$= \boxed{66\sqrt{5} - 6\sqrt{3}}$

10. $(14 + 3i) - (15 - 5i)$

$-15+5i$

$\boxed{-1+8i}$

Multiply and simplify.

11. $(5 + \sqrt{2})^2$ $(5+\sqrt{2})$

$25 + 5\sqrt{2} + 5\sqrt{2} + \cancel{\sqrt{4}}^{\,2}$

$= \boxed{27 + 10\sqrt{2}}$

12. $\sqrt{-10} \cdot \sqrt{-10}$

$i\sqrt{10} \cdot i\sqrt{10}$

$= i^2\sqrt{100}$

$= -1 \cdot 10$

$= \boxed{-10}$

13. $(6 + 8i)(7 - 2i)$

$42 - 12i + 56i - 16i^2$ $+16$

$= \boxed{58 + 44i}$

Simplify.

14. $\frac{6\sqrt{7}}{\sqrt{8}} \cdot \frac{\sqrt{8}}{\sqrt{8}} = \frac{6\sqrt{56}}{\sqrt{64}}$

$\frac{12\sqrt{14}}{8} = \boxed{\frac{3\sqrt{14}}{2}}$

15. $\frac{3-\sqrt{2}}{1+2\sqrt{3}} \cdot \frac{1-2\sqrt{3}}{1-2\sqrt{3}}$

$\frac{3-6\sqrt{3}-\sqrt{2}+2\sqrt{6}}{1-\cancel{2\sqrt{3}}+\cancel{2\sqrt{3}}-\cancel{4\sqrt{9}}}$ 12

$= \boxed{\frac{-3+6\sqrt{3}+\sqrt{2}-2\sqrt{6}}{11}}$

16. $\frac{7+2i}{6-8i} \cdot \frac{6+8i}{6+8i}$

$= \frac{42+56i+12i+16i^2}{36+48i-48i-64i^2}$ -16 $+64$

$= \frac{26+68i}{100} = \boxed{\frac{13+34i}{50}}$

17. $(4d+8d^2)-(7d^2-6d)$

$-7d^2+6d$

$\boxed{d^2+10d}$

18. $(x-2)(x+6)^2$ $(x+6)$

$x^2+6x-2x-12$

$=(x^2+4x-12)(x+6)$

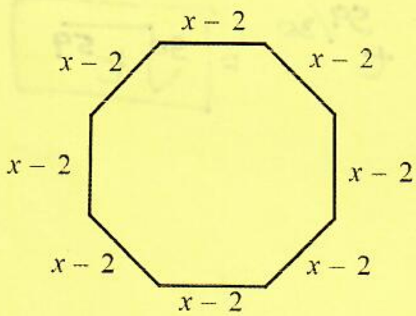
x^3+6x^2

$+4x^2+24x$

$-12x-72$

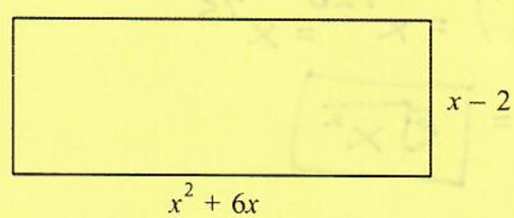
$\boxed{x^3+10x^2+12x-72}$

33. Find the perimeter.



$\boxed{8x-16}$

34. Find the area.



$(x^2+6x)(x-2)$

$x^3-2x^2+6x^2-12x$

$\boxed{x^3+4x^2-12x}$