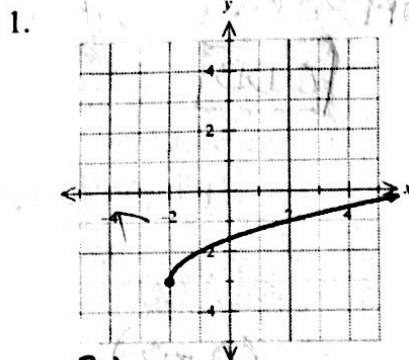


Name: _____

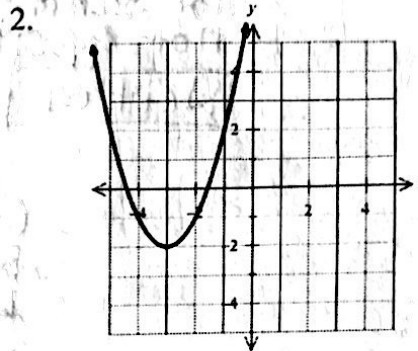
Period: Key

SM2H Quarter 1 Review (Units 1 and 2)

Find the domain and range of each function.



2pt
Domain: $[-2, \infty)$ left to right
Range: $[-3, \infty)$ down to up

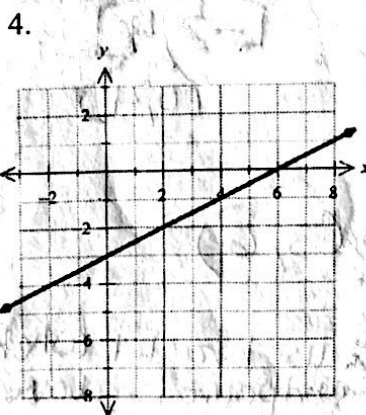


2pt
Domain: $(-\infty, \infty)$
Range: $[-2, \infty)$

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.

- 4pt
- What unit does the real world domain represent? time
 - What unit does the real world range represent? Cost
 - What is the real world domain? $[2, 5]$
 - What is the real world range? $[5047.99, 12544.99]$

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.



x-intercept: $(6, 0)$ 2pt
y-intercept: $(0, -3)$

5. $4x - 9y = 36$

x int
 $4x - 9 \cdot 0 = 36$
 $4x = 36$
 $x = 9$

y int
 $4 \cdot 0 - 9y = 36$
 $-9y = 36$
 $y = -4$

2pt
x-intercept: $(9, 0)$
y-intercept: $(0, -4)$

* Plug in $-x$, if it simplifies to same equation it's even - opposite is odd
 Determine algebraically the type of symmetry for each of the following functions. Show all your work

6. $f(x) = x^2$
 $f(-x) = (-x)^2$
 $= -x \cdot -x$
 $f(-x) = x^2$

Even

same

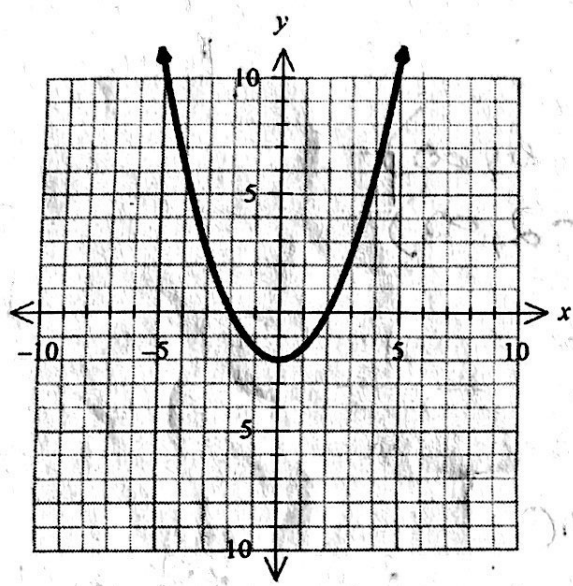
7. $g(x) = 3x + 6$
 $g(-x) = 3(-x) + 6$
 $g(-x) = -3x + 6$

not same
 not opposite
Neither

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

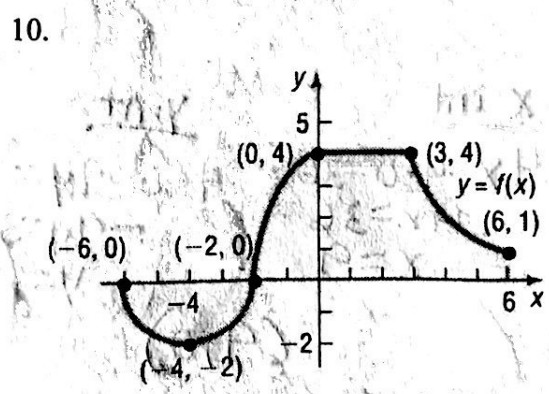
opposite
ODD

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



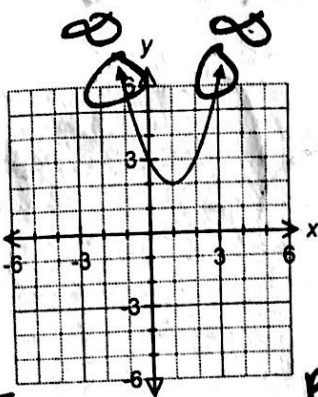
9. Domain: $(-\infty, \infty)$ 1 pt each line
 Range: $[-2, \infty)$
 x-intercepts: $(-2, 0)$ $(2, 0)$ y-intercept: $(0, -2)$
 Increasing: $(0, \infty)$ } always use parentheses
 Decreasing: $(-\infty, 0)$ }
 Positive: $(-\infty, -2) \cup (2, \infty)$
 Negative: $(-2, 2)$
 Maximum/Minimum point(s): $(0, -2)$
 Maximum/Minimum value(s): -2

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

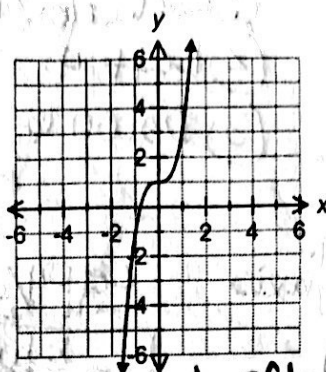


10. Domain: $[-6, 6]$ Range: $[-2, 4]$
 x-intercepts: $(-6, 0)$ $(-2, 0)$ y-intercept: $(0, 4)$
 Increasing: $(-4, 0)$
 Decreasing: $(-6, -4) \cup (3, 6)$
 Constant: $(0, 3)$
 Positive: $(-2, 6]$ * use bracket when endpoint is above or below x axis
 Negative: $(-6, -2)$ for positive or negative

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



2pt



2pt

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

Right
 $\lim_{x \rightarrow \infty} f(x) = \infty$

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

Right
 $\lim_{x \rightarrow \infty} f(x) = \infty$

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.

13. $y = 2|x + 1| - 6$
 1pt Parent: $y = |x|$

Transformations:

3pt

- Vertical stretch by 2
- Left 1
- Down 6

14. $y = -3\sqrt{x} + 2$
 1pt Parent: $y = \sqrt{x}$

Transformations:

2pt

- Reflect over x axis
- stretch vertically by 3
- up 2

15. $y = 2(x + 1)^2 + 4$
 1pt Parent: $y = x^2$

Transformations:

- Vertical stretch of 2
- Left 1
- up 4

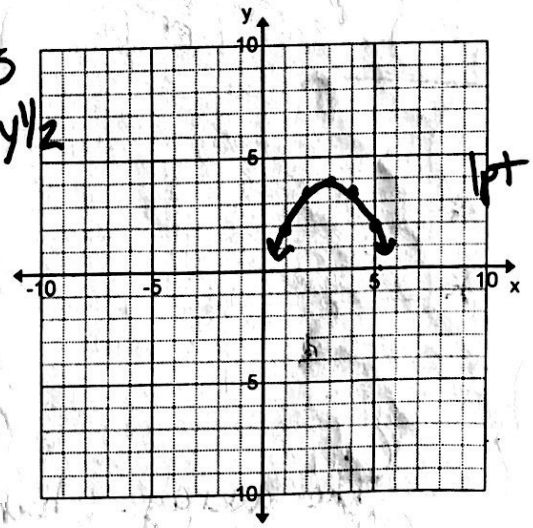
Use transformations to graph each function. Create a table that clearly shows the original points and the transformations that will be applied. Graph the final transformed function on the grid provided. State the vertex or starting point and the domain and range.

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

List Transformations in order here:

4pt

- Reflect over x axis
- Vertical shrink by 1/2
- Right 3
- Up 4



Tables: $y = x^2$

| x | y |
|----|---|
| -2 | 4 |
| -1 | 1 |
| 0 | 0 |
| 1 | 1 |
| 2 | 4 |

Reflect & Shrink
 add 3 add 4

| x | y |
|----|------|
| -2 | -2 |
| -1 | -1/2 |
| 0 | 0 |
| 1 | -1/2 |
| 2 | -2 |

Right 3/up 4

| x | y |
|---|-----|
| 1 | 3 |
| 2 | 3.5 |
| 3 | 4 |
| 4 | 3.5 |
| 5 | 3 |

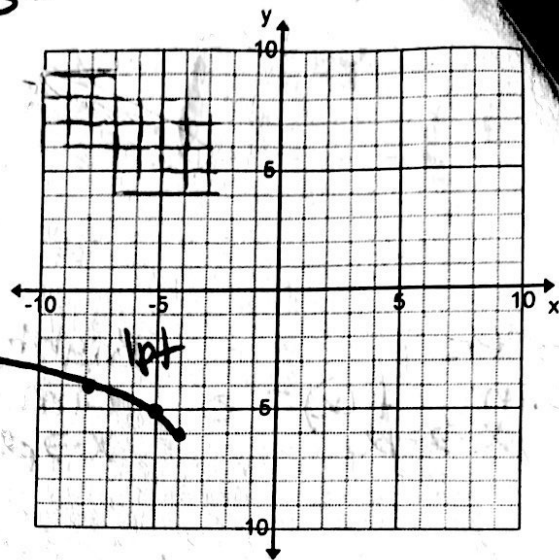
Domain: $(-\infty, \infty)$ Range: $(-\infty, 4]$ Vertex: $(3, 4)$

3pt

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

List Transformations in order here:

- 3pt
- ① Reflect over y axis ← mult. x values
 - ② Left 4
 - ③ Down 6



Tables:

$y = \sqrt{x}$

| x | y |
|---|---|
| 0 | 0 |
| 1 | 1 |
| 4 | 2 |
| 9 | 3 |

Reflect over y axis

| x | y |
|----|---|
| 0 | 0 |
| -1 | 1 |
| -4 | 2 |
| -9 | 3 |

Left 4/down 6

| x | y |
|-----|----|
| -4 | -6 |
| -5 | -5 |
| -8 | -4 |
| -13 | -3 |

Domain: $(-\infty, -4]$ Range: $[-6, \infty)$ Endpoint: $(-4, -6)$ 3pt

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

Find slope $m = \frac{y_2 - y_1}{x_2 - x_1}$

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

$(-2, 3)$
 $(4, -1)$

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

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

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

19. 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 |

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

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

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

The average change in height from 1-3 seconds is 12 ft/sec.

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

mult. exp

21. $\frac{5^1 x^2 y^4 z^7}{4^2 x^6 y^2 z^{10-5}}$

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

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

$$\frac{3^{-2}p^{4+2}q^{-6}}{6^{-2}p^{-12}q^{-2+6}} = \frac{6^2 p^{16}}{3^2 q^4} = \frac{3^4 p^{16}}{9q^4}$$

$$= \frac{4p^{16}}{9q^4}$$

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

$$= \frac{b^{3/2}}{a}$$

Simplify each radical expression.

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

$$\sqrt[3]{2 \cdot 3 \cdot 3 \cdot 3 x^3 y^3}$$

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

25. $15\sqrt{28p^7q^6}$

$$2 \cdot 15 \sqrt{2 \cdot 2 \cdot 7 p^6 p q^6}$$

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

26. $\sqrt{-60}$

$$i\sqrt{60}$$

$$2i\sqrt{2 \cdot 3 \cdot 5}$$

$$2i\sqrt{15}$$

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

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

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

$$x^{8/20} = x^{2/5}$$

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

28. $\sqrt[5]{t^4} \cdot \sqrt[6]{t^7}$ *Add Exponents

$$t^{4/5} \cdot t^{7/6}$$

$$t^{59/30}$$

$$\frac{4}{5} + \frac{7}{6} = \frac{24}{30} + \frac{35}{30} = \frac{59}{30}$$

or $\sqrt[30]{t^{59}}$

Add or subtract and simplify.

29. $2\sqrt{45} - 6\sqrt{3} + 15\sqrt{80}$

$$2\sqrt{3 \cdot 3 \cdot 5} - 6\sqrt{3} + 15\sqrt{2 \cdot 2 \cdot 2 \cdot 5}$$

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

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

30. $(14 + 3i) + (15 + 5i)$

$$-1 + 8i$$

Subtract - Add opposite
Add like terms

Multiply and simplify.

31. $(5 + \sqrt{2})^2$ rewrite and Foil

$$(5 + \sqrt{2})(5 + \sqrt{2})$$

$$\underline{25 + 5\sqrt{2} + 5\sqrt{2} + 2}$$

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

32. $\sqrt{-10} \cdot \sqrt{-10}$ *simplify first then multiply

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

$$i^2 \sqrt{100}$$

$$-1 \cdot 10$$

$$-10$$

33. $(6 + 8i)(7 - 2i)$ FOIL

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

$$42 + 44i + 16$$

$$58 + 44i$$

Simplify.

$$2 \cdot 6 \sqrt{2} \cdot 2 \cdot 7$$

$$34. \frac{6\sqrt{7} \sqrt{8}}{\sqrt{8} \sqrt{8}} = \frac{6\sqrt{56}}{8}$$

$$3 \frac{12\sqrt{14}}{28}$$

$$\frac{3\sqrt{14}}{2}$$

$$35. \frac{(3-\sqrt{2})(1-2\sqrt{3})}{(1+2\sqrt{3})(1-2\sqrt{3})}$$

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

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

$$36. \frac{(7+2i)(6+8i)}{(6-8i)(6+8i)}$$

$$\frac{42+56i+12i+16i^2}{36+48i-48i-64i^2} = \frac{42+68i-16}{36+64}$$

$$\frac{26+68i}{100} \div 2$$

$$\frac{13+34i}{50}$$

$$37. \frac{(4d+8d^2)+(7d^2+6d)}{d^2+10d}$$

Add like terms

$$38. (x-2)(x+6)^2$$

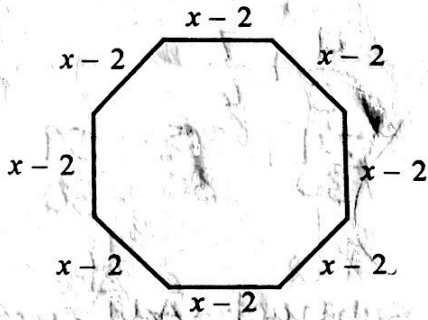
$$(x-2)(x^2+6x+6x+36)$$

$$(x-2)(x^2+12x+36)$$

$$x^3+12x^2+36x-2x^2-24x-72$$

$$x^3+10x^2+12x-72$$

39. Find the perimeter.

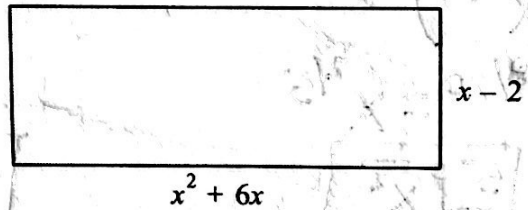


Add all sides

$$(x-2)+(x-2)+(x-2)+(x-2)+(x-2)+(x-2)+(x-2)+(x-2)$$

$$8x-16$$

40. Find the area.



FOIL

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

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

$$x^3+4x^2-12x$$

Factor out the GCF.

41. $14x^3 - 7x^2 - 35x$

$$7x(2x^2 - x - 5)$$

42. $25x^3 - 40x^2 + 10x$

$$5x(5x^2 - 8x + 2)$$

43. $3x^4 + 12x^2 - 28x$

$$x(3x^3 + 12x - 28)$$

44. $2a^2 + 12ab + 6b^2$

$$2(a^2 + 6ab + 3b^2)$$

45. $3a^2b^2 + 15ab^3$

$$3ab^2(a + 5b)$$

46. $24ab^4 + 12ab^3 - 18ab^2$

$$6ab^2(4b^2 + 2b - 3)$$

Factor by grouping.

$$47. \frac{a^2 - 2a + ad - 2d}{a(a-2) + d(a-2)} \\ (a+d)(a-2)$$

$$48. \frac{uv + 5u + v^2 + 5v}{u(v+5) + v(v+5)} \\ (u+v)(v+5)$$

$$49. \frac{ad + 3a - d^2 - 3d}{a(d+3) - d(d+3)} \\ (a-d)(d+3)$$

$$50. \frac{y^3 + y^2 + 2y + 2}{y^2(y+1) + 2(y+1)} \\ (y^2+2)(y+1)$$

$$51. \frac{m^3 + m^2n + mn^2 + n^3}{m^2(m+n) + n^2(m+n)} \\ (m+n)(m^2+n^2)$$

$$52. \frac{u^3 - u^2v + uv^2 - v^3}{u^2(u-v) + v^2(u-v)} \\ (u^2+v^2)(u-v)$$

$$\frac{2ab + 14a + b + 7}{2a(b+7) + 1(b+7)}$$

$$(2a+1)(b+7)$$

$$54. \frac{m^2 + mn - 3m - 3n}{m(m+n) - 3(m+n)} \\ (m-3)(m+n)$$

$$55. \frac{5x^2y - x^2 + 5y - 1}{x^2(5y-1) + 1(5y-1)} \\ (x^2+1)(5y-1)$$

Factor the following trinomials.

$$56. x^2 + 8x + 7 \quad \begin{array}{r} x \quad + \\ 7 \quad | \quad 8 \\ \hline 7 \quad | \quad 1 \end{array} \\ (x+7)(x+1)$$

$$57. x^2 + 17x + 30 \quad \begin{array}{r} x \quad + \\ 30 \quad | \quad 17 \\ \hline 15 \quad | \quad 2 \end{array} \\ (x+15)(x+2)$$

$$58. x^2 - 18x + 32 \quad \begin{array}{r} x \quad + \\ 32 \quad | \quad -18 \\ \hline -16 \quad | \quad 2 \end{array} \\ (x-16)(x-2)$$

$$59. x^2 + 9x + 18 \quad \begin{array}{r} x \quad + \\ 18 \quad | \quad 9 \\ \hline 6 \quad | \quad 3 \end{array} \\ (x+6)(x+3)$$

$$60. x^2 - 8x + 12 \quad \begin{array}{r} x \quad + \\ 12 \quad | \quad -8 \\ \hline -6 \quad | \quad 2 \end{array} \\ (x-6)(x-2)$$

$$61. x^2 - 10x - 24 \quad \begin{array}{r} x \quad + \\ -24 \quad | \quad -10 \\ \hline -12 \quad | \quad 2 \end{array} \\ (x-12)(x+2)$$