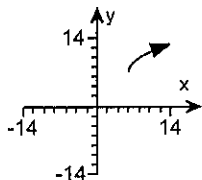| Student: _____	Instructor: Joe Betters	
Date: _____	Course: Pre-Calculus Pre AP (Master Course)	Assignment: 2.5 / 2.6 / 5.2 Classwork

1. Graph the following function using the techniques of shifting, compressing, stretching, and/or reflecting. Start with the graph of the basic function shown to the right. Find the domain and range of the function.
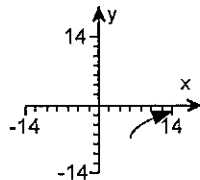
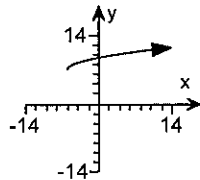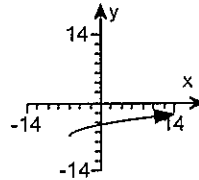 $$g(x) = 2\sqrt{x-6} + 7$$
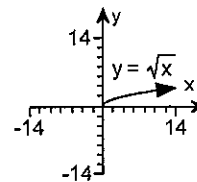
Choose the correct graph below.

○ **A.**   ○ **B.**   ○ **C.**   ○ **D.**
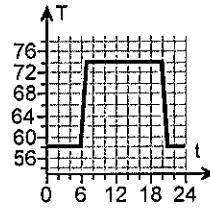

Find the domain of g(x).

_____

(Type your answer in interval notation.)

Find the range of g(x).

_____

(Type your answer in interval notation.)

ID: 2.5.59

2. In the given graph, the temperature T (in degrees Fahrenheit) of a home is given as a function of time t (in hours after midnight) over a 24-hour period.

(a) At what temperature is the thermostat set during daytime hours? At what temperature is the thermostat set overnight?

The thermostat is set to _____ degrees Fahrenheit during the daytime hours.
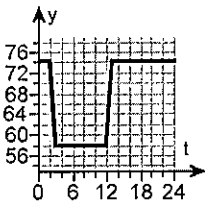
The thermostat is set to _____ degrees Fahrenheit overnight.

(b) The homeowner reprograms the thermostat to y = T(t) − 6. Explain how this change affects the temperature in the house. Graph this new function.

This change will (1) _____ .

Choose the graph that shows y = T(t) − 6.

○ A.

○ B.

○ C.

○ D.

(c) The homeowner reprograms the thermostat to y = T(t + 4). Explain how this change affects the temperature in the house. Graph this new function.
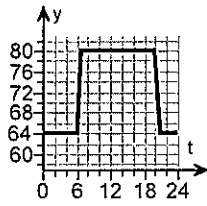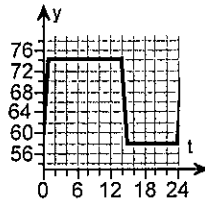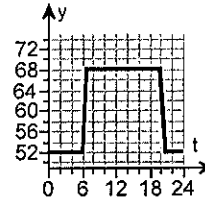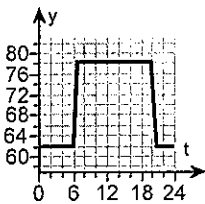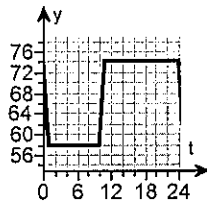
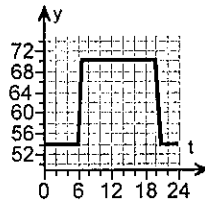This change will (2) _____ .

Choose the graph that shows y = T(t + 4).

○ A.

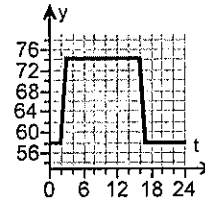
○ B.

○ C.

○ D.

(1) ○ move the temperature change 6 hours later
    ○ lower the temperature by 6 degrees
    ○ move the temperature change 6 hours earlier
   ○ raise the temperature by 6 degrees

(2) ○ raise the temperature by 4 degrees
    ○ move the temperature change 4 hours earlier
    ○ lower the temperature by 4 degrees
   ○ move the temperature change 4 hours later

ID: 2.5.85

3. The daily profits of a cigar company from selling x cigars are given by the equation $p(x) = -0.05x^2 + 100x - 2000$. The company has the option of either paying a flat tax of $12,000 per day or a tax of 10 % on profits. The company's CFO needs to decide which tax is better for the company.

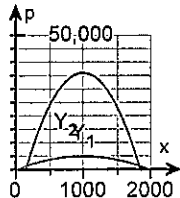(a) Choose the correct graph of $Y_1 = p(x) - 12,000$ and $Y_2 = (1 - 0.1)p(x)$ graphed on the same set of axes.
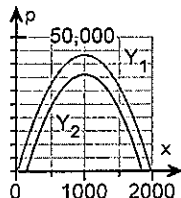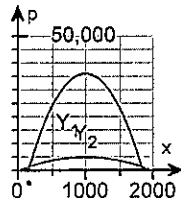
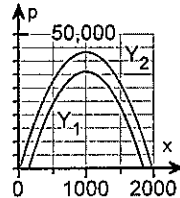○ A.   ○ B.   ○ C.   ○ D.

(b) Based on the graph, the best tax option is (1) _____ .

(c) If the government were to offer the options of a flat tax of $7100 or a tax of 10% on profits, which would be the better option?

The better option would be (2) _____ .

(1) ○ 10 % on profits   (2) ○ 10 % on profits
     ○ $12,000 per day   ○ $7100 per day

ID: 2.5.89

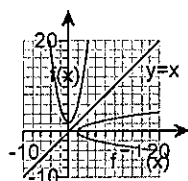4. The function $f(x) = x^2 + 2$, $x \geq 0$, is one-to-one.
(a) Find the inverse of f.
(b) Graph f, f^{-1}, and y = x on the same set of axes.

(a) Find the inverse of f.

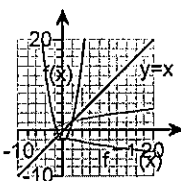$f^{-1}(x) =$ _____

(b) Graph f, f^{-1}, and y = x on the same set of axes. Choose the correct graph below.
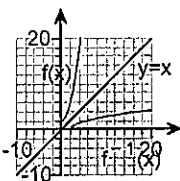
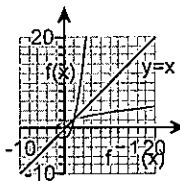○ A.   ○ B.   ○ C.   ○ D.

ID: 5.2.55

5. If f(26) = 20 and f is one-to-one, what is $f^{-1}(20)$?

$f^{-1}(20) =$ _____

ID: 5.2.75

6. A function f has an inverse function. If the graph of f^{-1} lies in quadrant III, in which quadrant does the graph of f lie?

In what quadrant does the graph of f lie?

○ Quadrant III
○ Quadrant IV
○ Quadrant I
○ Quadrant II

ID: 5.2.85

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7. Two cars are approaching an intersection. One is 2 miles south of the intersection and is moving at a constant speed of 10 miles per hour. At the same time, the other car is 5 miles east of the intersection and is moving at a constant speed of 20 miles per hour.

(a) Express the distance d between the cars as a function of time t. (Hint: At t = 0, the cars are 2 miles south and 5 miles east of the intersection, respectively.)

$$d = \sqrt{\underline{\hspace{3cm}} t^2 - \underline{\hspace{3cm}} t + \underline{\hspace{3cm}}}$$

(b) Use a graphing utility to graph d = d(t). For what value of t is d smallest?
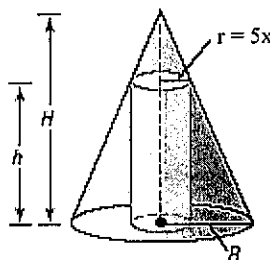
t ≈ _____ hours

(Round to three decimal places.)

ID: 2.6.19

8.
Inscribe a right circular cylinder of height h and radius r = 5x in a cone of fixed radius R and fixed height H. See the illustration. Express the volume V of the cylinder as a function of x.

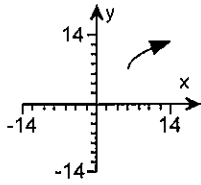[Hint: $V = \pi r^2 h$. Note also the similar triangles.]

Choose the correct answer below.

○ A. $V(x) = \dfrac{25H\pi}{R}(R - 5x)x^2$

○ B. $V(x) = \dfrac{125H\pi}{R}x^3$

○ C. $V(x) = 25h\pi x$

○ D. $V(x) = 25H\pi\left(1 - \dfrac{5x}{R}\right)x$

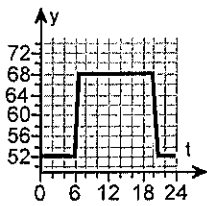ID: 2.6.21

1.

A.

$[6,\infty)$

$[7,\infty)$

---

2. 74

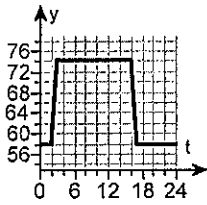58

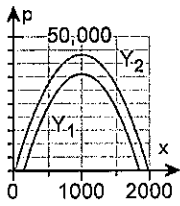(1) lower the temperature by 6 degrees

D.

(2) move the temperature change 4 hours earlier

D.

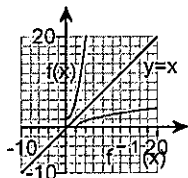
3.

D.

(1) 10 % on profits

(2) 10 % on profits

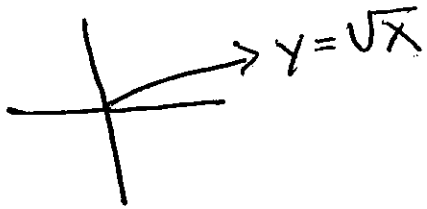4. $\sqrt{x-2}$

C.

---

5. 26

6. Quadrant III

7. 500

   240

   29

   0.240

8.
A. $V(x) = \dfrac{25H\pi}{R}(R - 5x)x^2$

2.5/2.6/5.2 classwork
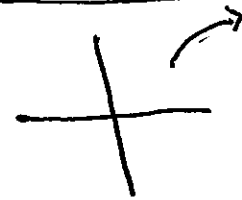
①

$y = \sqrt{x}$

$$g(x) = 2\sqrt{x-6} + 7$$

↑ moves right 6 units

↑ moves up 7 units

Graph A

Domain $[6, \infty)$

Range $[7, \infty)$

②

74

58

a) Thermostat set to $74°$ during day

Thermostat set to $58°$ overnight

b) $y = T(t) - 6$ lower Temperature 6 degrees

Graph D

c) $y = T(t+4)$

moves Temperature Change   Graph D
4 hours earlier

③ $p(x) = -.05x^2 + 100x - 2000$

a) $p(x) - 12000 = Y_1$ $\{(1-.01)p(x) = Y_2$

$-.05x^2 + 100x - 14000$ $-.045x^2 + 90x - 1800$

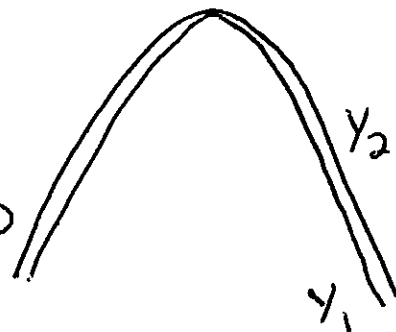Graph $\boxed{D}$

Y_2

Y_1

b) $\boxed{\text{best tax option}\\10\% \text{ on profits}}$

Y_2 has greater maximum

c) flat tax of 7100
OR 10% profits

$-.05x^2 + 100x - 7100 - 2000$
$-.05x^2 + 100x - 9100$

$\boxed{10\% \text{ best}\\ \text{on profits}}$

Y_2

Y_1

④ $f(x) = x^2 + 2$, $x \geq 0$, is one-to-one

a) Inverse

$$x = y^2 + 2$$
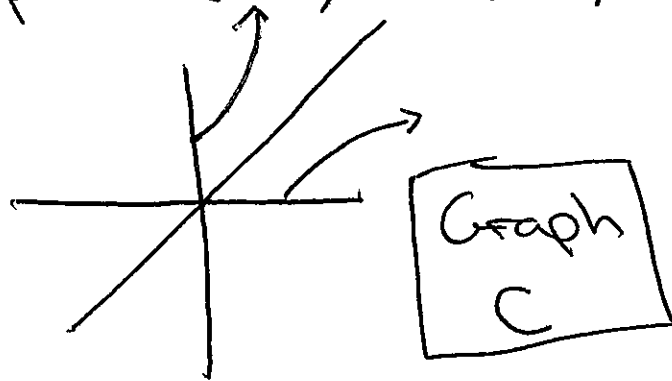
$$x - 2 = y^2$$

$$\pm\sqrt{x-2} = y$$

$$y = \sqrt{x-2}$$

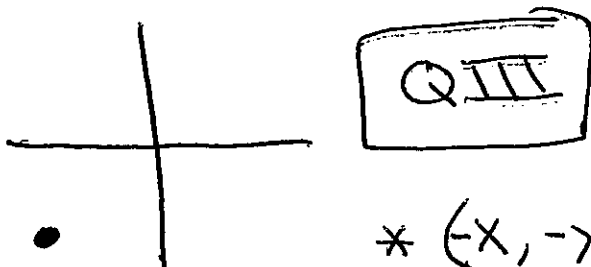$$\boxed{f^{-1}(x) = \sqrt{x-2}}$$

b) Graph $f(x)$, $f^{-1}(x)$, $y = x$

Graph C

⑤ If $f(26) = 20$ and f is one-to-one, what is $f^{-1}(20)$

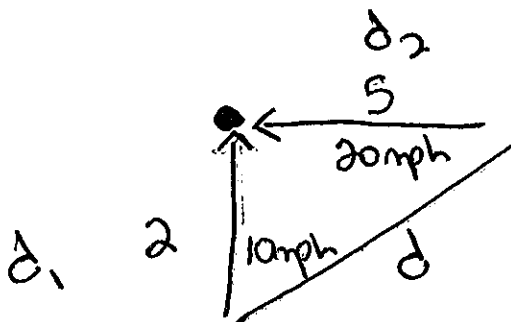   * flip x and y $\boxed{26}$

⑥

     QIII

III

     * $(-x, -y)$ Q3

     flip and both still $(-)$
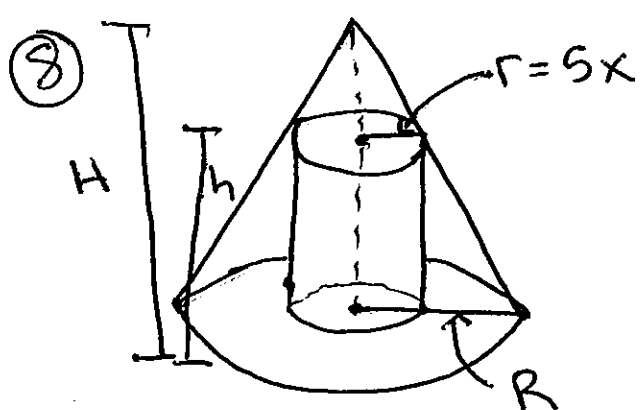
⑦

$d_1 = (2 - 10t)$

$d_2 = (5 - 20t)$

$$d = \sqrt{(2-10t)^2 + (5-20t)^2}$$

$$\boxed{d = \sqrt{500t^2 - 240t + 29}}$$

* CALCULATOR $y_1 = d$

     minimum at $\boxed{x = .240}$

2.5, 2.6, 5.2 classwork continued

⑧

$r = 5x$

$$\frac{H}{R} = \frac{H-h}{r} \qquad \text{Similar } \Delta\text{'s}$$

$$Hr = R(H-h)$$
$$Hr = RH - Rh$$
$$Rh = RH - Hr$$
$$h = \frac{RH - Hr}{R} = \frac{H(R-r)}{R}$$

$$V = \pi r^2 h$$

$$= \pi r^2 \left(\frac{H(R-r)}{R} \right)$$

$$= \frac{\pi H(R-r) r^2}{R}$$

~~~~~~~~~~~~~~~~

$r = 5x$

$$V(x) = \frac{\pi H (R-5x)(25x^2)}{R}$$

$$\boxed{V(x) = \frac{25H\pi}{R}(R-5x)x^2}$$