Student: _____ **Date:** _____	**Instructor:** Joe Betters **Course:** Pre-Calculus Pre AP (Master Course)	**Assignment:** 6.2 Classwork Day 2

1. Let f(x) = **sin** x.

   (a) Find $f\left(\frac{\pi}{4}\right)$. What point is on the graph of f?

   (b) Using the result of part (a), what point is on the graph of f^{-1}?

   (c) What point is on the graph of $y = f\left(x + \frac{\pi}{4}\right) + 3$ if $x = \frac{\pi}{4}$?

(a) $f\left(\frac{\pi}{4}\right)$ = _____

(Simplify your answer, including any radicals. Use integers or fractions for any numbers in the expression.)

What point is on the graph of f?

_____

(Type an ordered pair. Type an exact answer, using π as needed. Use integers or fractions for any numbers in the expression.)

(b) What point is on the graph of f^{-1}?

_____

(Type an ordered pair. Type an exact answer, using π as needed. Use integers or fractions for any numbers in the expression.)

(c) What point is on the graph of $y = f\left(x + \frac{\pi}{4}\right) + 3$ if $x = \frac{\pi}{4}$?

_____

(Type an ordered pair. Type an exact answer, using π as needed. Use integers or fractions for any numbers in the expression.)

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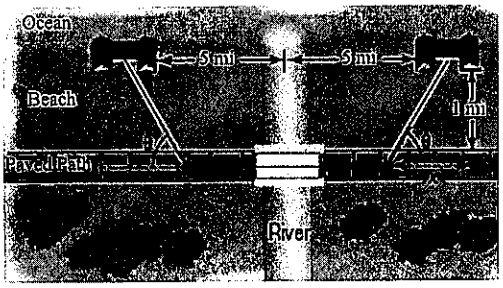
2. Two homes are located 10 miles apart, each 1 mile from a road that parallels the ocean. Sally can jog 10 mph along the road, but only 9 mph in the sand. Because of a river between the two houses, it is necessary to jog on the sand to the road, continue on the road, and then jog on the sand to get from one house to the other. For $0^\circ < \theta < 90^\circ$, the time T to get from one house to the other is a function of θ, as shown.



$$T(\theta) = 1 + \frac{2}{9\sin\theta} - \frac{1}{5\tan\theta},\ 0^\circ < \theta < 90^\circ$$

(a) Calculate the time T for $\theta = 30^\circ$. How long is Sally on the paved road?

$T(30^\circ) =$ _____
(Do not round until the final answer. Then round to two decimal places as needed.)

How long is Sally on the paved road for $\theta = 30^\circ$?

_____ hours
(Do not round until the final answer. Then round to two decimal places as needed.)

(b) Calculate the time T for $\theta = 45^\circ$. How long is Sally on the paved road?

$T(45^\circ) =$ _____
(Do not round until the final answer. Then round to two decimal places as needed.)

How long is Sally on the paved road for $\theta = 45^\circ$?

_____ hours
(Do not round until the final answer. Then round to two decimal places as needed.)

(c) Calculate the time T for $\theta = 60^\circ$. How long is Sally on the paved road?

$T(60^\circ) =$ _____
(Do not round until the final answer. Then round to two decimal places as needed.)

How long is Sally on the paved road for $\theta = 60^\circ$?

_____ hours
(Do not round until the final answer. Then round to two decimal places as needed.)

(d) Calculate the time T for $\theta = 90^\circ$. Describe the path taken. Why can't the formula for T be used?

Why can't the formula for T be used when $\theta = 90^\circ$?

○ **sin** 90° is undefined ○ **tan** 90° is undefined

Which sentence best describes the path taken when $\theta = 90^\circ$?

○ **A.** Sally jogs 2 miles in the sand and 10 miles on the paved road.
○ **B.** Sally jogs 5 miles to the bridge, then 5 miles to the other house.
○ **C.** Sally jogs 1 mile in sand, then 10 miles on the paved road, then 1 mile in sand.

When $\theta = 90^\circ$, the time T to get from one house to the other is _____ hours.
(Do not round until the final answer. Then round to two decimal places as needed.)

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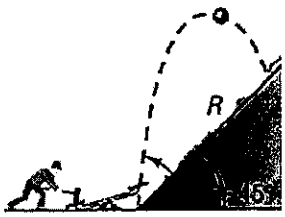
3. 

An object is propelled upward at an angle θ, $45^\circ < \theta < 90^\circ$, to the horizontal with an initial velocity of v_0 feet per second from the base of a plane that makes an angle of 45° with the horizontal. If air resistance is ignored, the distance R that it travels up the inclined plane is given by

$$R = \frac{v_0^2\sqrt{2}}{32}[\sin(2\theta) - \cos(2\theta) - 1]$$

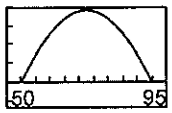
(a) Find the distance R that the object travels along the inclined plane if the initial velocity is 80 feet per second and $\theta = 60^\circ$.

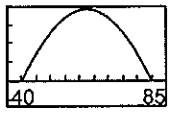
$R \approx$ _____ feet

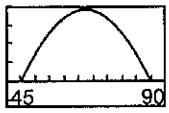
(Do not round until the final answer. Then round to one decimal place as needed.)

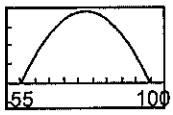
(b) Graph $R = R(\theta)$ if the initial velocity is 80 feet per second. Choose the correct graph of $R = R(\theta)$.

○ A. ○ B. ○ C. ○ D.









(c) What value of θ makes R largest? Choose the correct answer below.

○ A. 62.5° ○ B. 67.5° ○ C. 72.5° ○ D. 77.5°

1. $\frac{\sqrt{2}}{2}$

$\left(\frac{\pi}{4}, \frac{\sqrt{2}}{2}\right)$

$\left(\frac{\sqrt{2}}{2}, \frac{\pi}{4}\right)$

$\left(\frac{\pi}{4}, 4\right)$

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2. 1.1

0.65

1.11

0.8

1.14

0.88

tan 90° is undefined

C. Sally jogs 1 mile in sand, then 10 miles on the paved road, then 1 mile in sand.

1.22

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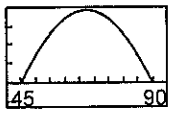
3. 103.5

C. 

B. 67.5°

6.2 classwork day 2

① $f(x) = \sin x$

a) $f(\pi/4) = \sin \pi/4 = \frac{\sqrt{2}}{2}$ $\left(\pi/4, \frac{\sqrt{2}}{2}\right)$

b) f^{-1} * flip x & y $\left(\frac{\sqrt{2}}{2}, \pi/4\right)$

c) $f\left(x + \frac{\pi}{4}\right) + 3$ if $x = \pi/4$

$\sin\left(x + \pi/4\right) + 3$

$\sin\left(\pi/4 + \frac{\pi}{4}\right) + 3$

$\sin \pi/2 + 3$

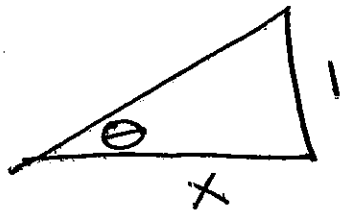
$1 + 3 = 4$ $\left(\pi/4, 4\right)$

6.2 classwork day 2 continued

② $T(\theta) = 1 + \frac{2}{9\sin\theta} - \frac{1}{5\tan\theta}$ $\quad 0° < \theta < 90°$

$T(\text{on road}) = \frac{D(\text{on road})}{R(\text{on road})} = \frac{10-2x}{10} = 1 - \frac{x}{5}$

$= \frac{1 - \left(\frac{1}{\tan\theta}\right)}{5}$



$\tan\theta = \frac{1}{x}$

* $x = \frac{1}{\tan\theta}$

$T(\text{on road}) = 1 - \frac{1}{5\tan\theta}$

use to solve parts of problem

(continued) ⟶

6.2 classwork day 2 continued

(2) continued

a) $T(30°) = \boxed{1.1}$ use original long equation

$T(\text{on road}) = \boxed{.65}$ plug into T(on road) equation

b) $T(45°) = \boxed{1.11}$

$T(\text{on road}) = \boxed{.8}$

c) $T(60°) = \boxed{1.14}$

$T(\text{on road}) = \boxed{.88}$

d) $T(90°) =$ undefined

tan 90° undefined

divide by zero

$\theta = 90°$ $\boxed{C}$ jogs 1 mile on sand
10 miles on paved
1 mile on sand

$T(\text{on road}) + T(\text{sand})$

$*t = \frac{D}{r}$

$\frac{10 \text{ miles}}{10 \text{ mph}} + \frac{2 \text{ miles}}{9 \text{ mph}} = \boxed{1.22 \text{ hours}}$

6.2 classwork day 2 continued

(3) $R = \frac{V_0^2\sqrt{2}}{32}\left[\sin(2\theta) - \cos(2\theta) - 1\right]$

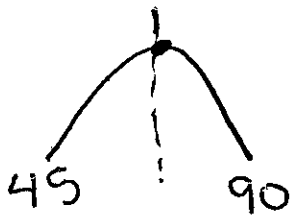
$45° < \theta < 90°$

a) $V_0 = 80$, $\theta = 60$

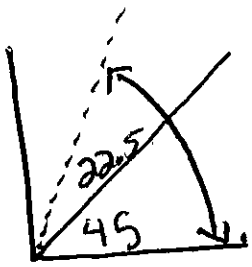
$\frac{80^2\sqrt{2}}{32}\left(\sin((2)(60)) - \cos((2)(60)) - 1\right)$

$\frac{80^2\sqrt{2}}{32}\left(\frac{\sqrt{3}}{2} - \left(-\frac{1}{2}\right) - 1\right) = \boxed{103.5}$ ft

b) Graph [C]



c)



$\boxed{67.5°}$

[B]

$R = 0$ at $45°$

$R = 0$ at $90°$