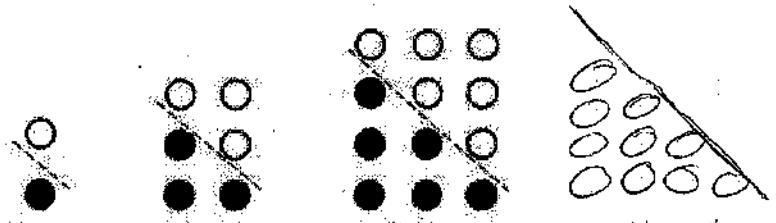
Exam Review #2 Functions

Name: Key

1. Each step in the pattern below contains black dots and white dots. In every step that follows Step 1, first a column of white dots is added on the right and then a row of black dots is added at the bottom.



1 3 6 10

Which of the following expressions represents the number of black dots in Step n?

A. $3(n-1)$ B. $\frac{n(n+1)}{2}$ C. $\frac{n^2}{2}$ D. $\frac{(n+1)^2}{2}$

$\frac{4(4+1)}{2} = 10$

2. The recursive formula for a sequence is shown below.

NEXT = 5 • NOW, starting at 9

$x^0 - 9$
$1 \quad 45$
$2 \quad 225$

x no geometric
$a \cdot b^x$

Which explicit formula can be used to determine the value of the nth term in the sequence?

A. $f(n) = 5n$ B. $f(n) = 5n + 9$ C. $f(n) = 1.8(5)^n$ D. $f(n) = 9(5)^n$

3. Changing the value of a in $y = ax^2 + c$ to its opposite has what effect on the graph?

A. It changes the width of the graph.

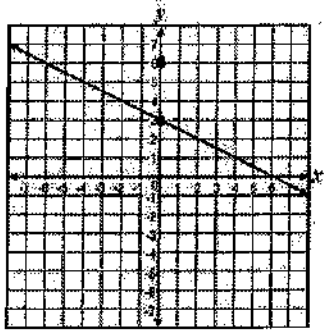
B. It changes the vertex of the graph.

C. It changes the graph's axis of symmetry.

D. It changes the direction that the graph opens.

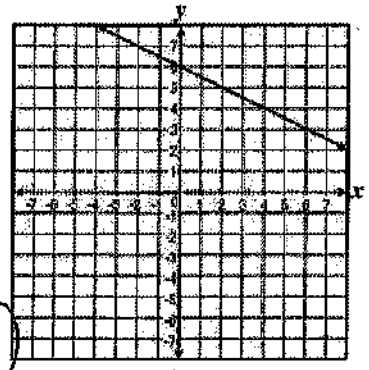
Ex: $y = -3x^2 + 1$
$y = 3x^2 + 1$

4. The graph of the equation $y = -\frac{1}{2}x + 3$ is shown below.

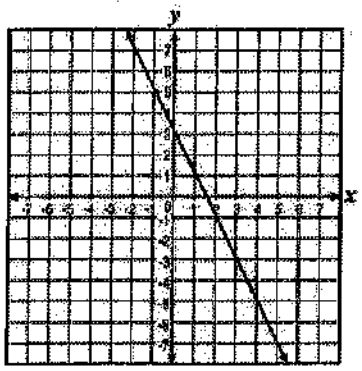


If the *y*-intercept of the line is changed to 6, which graph below represents the new line?

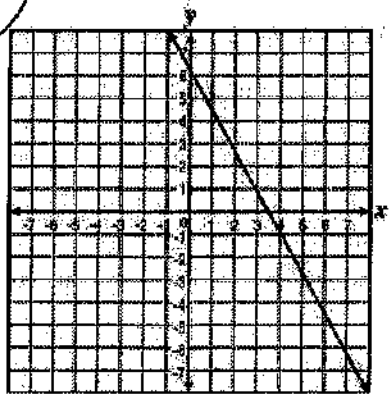
A.



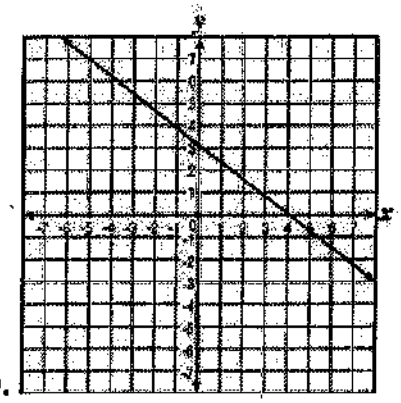
B.



C.



D.



$x = \frac{2}{5}y - 6$

$\frac{x+6}{2/5} = \frac{\frac{2}{5}y}{2/5}$

5. What is the inverse, $f^{-1}(x)$, of the function $f(x) = \frac{2}{5}x - 6$?

A. $f^{-1}(x) = -6x + \frac{2}{5}$ B. $f^{-1}(x) = -\frac{5}{2}x + 6$ C. $f^{-1}(x) = -\frac{2}{5}x + 6$ D. $f^{-1}(x) = \frac{5}{2}x + 15$

$y = \frac{5(x+6)}{2}$

$y = \frac{5x + 30}{2}$

$x = \frac{-2y+5}{3}$

$3x = -2y + 5$

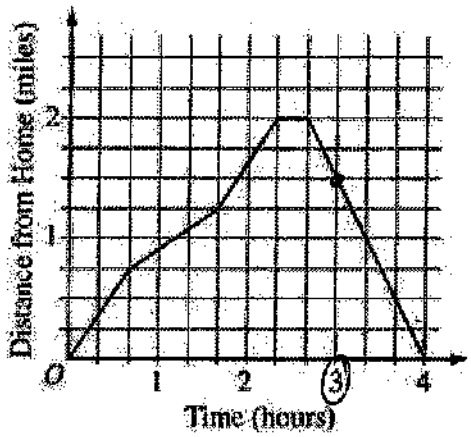
$3x - 5 = -2y$

$\frac{3x-5}{-2} = \frac{-(3x-5)}{2}$

6. What is the inverse, $f^{-1}(x)$, of the function $f(x) = \frac{-2x+5}{3}$?

A. $f^{-1}(x) = \frac{2x-5}{3}$ B. $f^{-1}(x) = \frac{3x-5}{2}$ C. $f^{-1}(x) = \frac{3}{-2x+5}$ D. $f^{-1}(x) = \frac{-3x+5}{2}$

7. The graph below shows Amy's distance from home on an afternoon hike.



How many miles from home was Amy after hiking for 3 hours?

A. 1.5 B. 2 C. 2.5 D. 4

8. A student used the following steps to solve a math problem.

Given: $\log_5(x) = 10$

Step 1: $x \log 5 = 10$

Step 2: $\frac{x \log 5}{5} = \frac{10}{5}$

Step 3: $x \log 1 = 2$

$x \log 5 = 10$

$\frac{x \log 5}{\log 5} = \frac{10}{\log 5}$

$x = \frac{10}{\log 5}$

In which step above does an error occur?

A. Step 1 B. Step 2 C. Step 3 D. No error is shown.

9. A company produces two types of widgets, type *f* and type *g*. The number of each type of widget produced at the end of *t* weeks can be modeled by the functions $f(t) = 298(2)^{0.075t}$ and $g(t) = 249(e)^{0.065t}$. Which expression cannot be used to determine the difference in the number of weeks it takes to produce 800 type *g* widgets, and the number of weeks it takes to produce 800 type *f* widgets?

A. $\frac{\ln\left(\frac{800}{298}\right)}{0.075\ln 2} - \frac{\ln\left(\frac{800}{249}\right)}{0.065}$

B. $\frac{\log\left(\frac{800}{298}\right)}{0.075\log 2} - \frac{\log\left(\frac{800}{249}\right)}{0.065\log e}$

C. $\frac{\log_2 800 - \log_2 298}{0.075} - \frac{\ln 800 - \ln 249}{0.065}$

D. $\frac{\log_2 800 - \log_2 298}{0.075} - \frac{\log_2 800 - \log_2 249}{0.065}$

$\log \frac{800}{298} =$

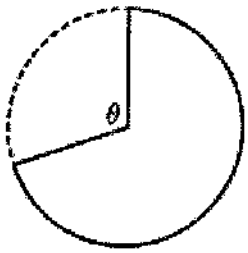
$\frac{800}{249} = 249e^{.065t}$

$\log \frac{800}{249} = .065t \log e$

10. The circle shown below has a diameter of 18 centimeters (cm). If the dotted arc is 33 cm long, what is the measure of angle θ in radians?

$33 = \frac{\theta}{2\pi}(2\pi(9))$

$\frac{33}{9} = \frac{9\theta}{9}$



$R = 9$

A. $\frac{3}{11}$

B. $\frac{6}{11}$

C. $\frac{11}{6}$

D. $\frac{11}{3}$

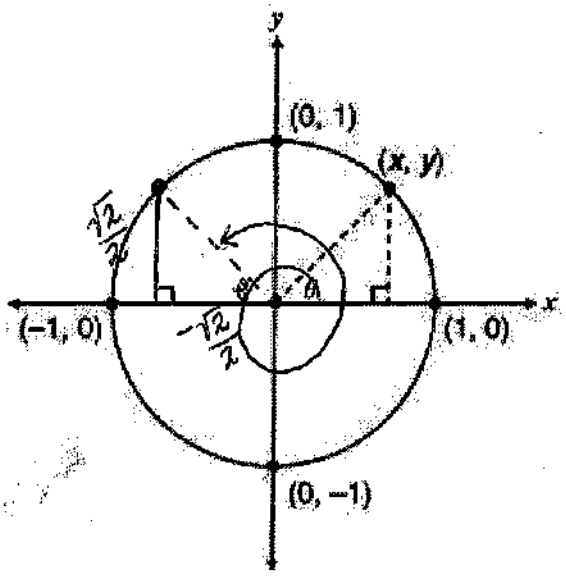
11. On the unit circle shown, which radian measure represents the point located at $\left(\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2}\right)$?

$\tan\theta = \frac{\frac{\sqrt{2}}{2}}{-\frac{\sqrt{2}}{2}}$

$\frac{\sqrt{2}}{2} \cdot \frac{2}{-\sqrt{2}}$

$\tan\theta = -1$

$\tan^{-1}(-1) = -45°$



$90 + 45 = 135°$, $\frac{\pi}{180}$

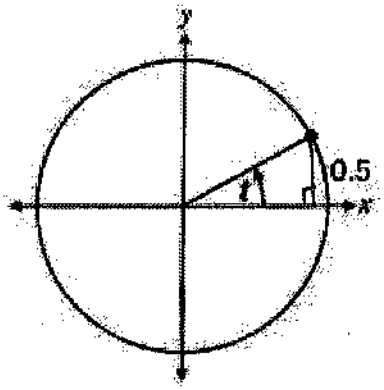
A. $\frac{5\pi}{4}$ $225°$

B. $\frac{7\pi}{4}$ $315°$

C. $\frac{9\pi}{4}$ $405°$

D. $\frac{11\pi}{4}$ $495°$ -360 $135°$

12. The figure below represents a unit circle.



Which statement about the figure is true?

A. $\sin t = \frac{1}{2}$

B. $\cos t = \frac{1}{2}$

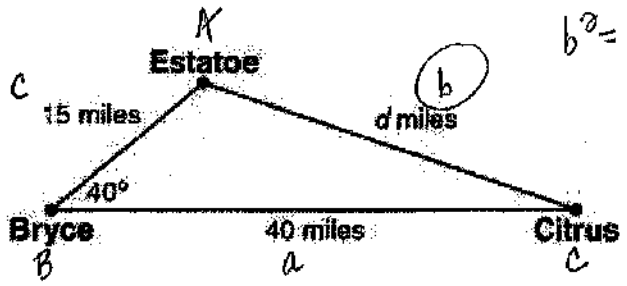
C. The measure of Angle t is 0.5 radian.

D. The measure of the length of the radius is 0.5 unit.

13. Samuel delivers produce on a route among the three cities shown in the figure.

law of cosines

$b^2 = 40^2 + 15^2 - 2(40)(15)\cdot\cos 40$



Which equation can be used to determine *d*, the distance in miles, from Estatoe to Citrus?

A. $d = 40 \tan 40°$

B. $d = \left(15^2 + 40^2\right) - (40 \times 2)\cos 40°$

C. $d = \sqrt{\left(15^2 + 40^2 - 40 \times 15 \times 2\right)}$

D. $d = \sqrt{15^2 + 40^2 - (40 \times 15 \times 2)\cos 40°}$

14. Using the Pythagorean identity, $\sin^2\theta + \cos^2\theta = 1$, what is $\tan\theta$ if $\cos\theta = -\frac{\sqrt{3}}{2}$ and $\pi < \theta < \frac{3\pi}{2}$?

a

h

$180° < x < 270°$

A. $-\sqrt{3}$

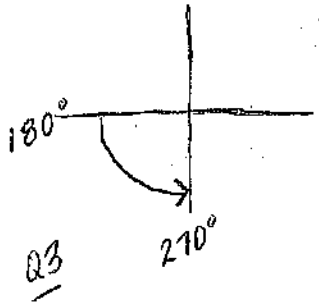
B. $-\frac{\sqrt{3}}{3}$

C. $\frac{\sqrt{3}}{3}$

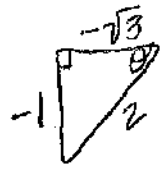
D. $\sqrt{3}$

$\pi \cdot \frac{180}{\pi} = 180°$

$\frac{3\pi}{2} \cdot \frac{180}{\pi} = 270°$



Q3



$a^2 + (-\sqrt{3})^2 = 2^2$

$a^2 + 3 = 4$

$a^2 = 1$

$a = 1$

$\tan\theta = \frac{-1}{-\sqrt{3}} \cdot \frac{-\sqrt{3}}{-\sqrt{3}} = \frac{\sqrt{3}}{3}$