# Circuit Training

Name: Key

AP Precalculus Review Circuit – **No Calculator!**

**Directions:** Begin in cell #1. Show the work necessary to arrive at your answer. You may require a separate sheet of paper. Search for your answer in one of the other cells and mark that cell #2, then work out the new problem. Proceed in this manner until you complete the circuit.

# ___1___ Answer: $-1$

Select values of two functions are given in the table. The functions are either linear, quadratic, or exponential. Determine the y-intercept of each function and then search for their product.

| $x$ | $f(x)$ | $g(x)$ | |
|---|---|---|---|
| 1 | 6 | 6 | −4 |
| 2 | 24 | 12 | +6 |
| 3 | 96 | 20 | +8 |
| 4 | 384 | 30 | +10 |

$g(0) = 2$

f is exponential with a constant ratio of 4

$f(0) = \frac{6}{4} = \frac{3}{2}$ $\quad f(0)\cdot g(0) = \frac{3}{2}\cdot 2 = 3$

# 9 Answer: $\frac{11}{2}$

Consider the functions $f(x) = \log_2(4x+5) - \log_2 x$, and $g(x) = \log_2 x$. In the $xy-$ coordinate plane, what are all $x$-coordinate(s) of the intersection(s) of the graphs of $f$ and $g$?

$\log_2(4x+5) = 2\log_2 x$

$4x+5 = x^2$

If there is more than one intersection, search for the product of the $x$-coordinates. If there is only one, search for the x-coordinate of the intersection.

$0 = x^2 - 4x - 5$

$0 = (x-5)(x+1)$ $\quad x=5$ ~~$x=-1$~~

# 7 Answer: 38

The function $y = \frac{x^2+5x+4}{3x^2-3}$ has a vertical asymptote at x = 1, a horizontal asymptote at y = $\frac{1}{3}$, a hole at x = −1, an x-intercept of x = −4 and a y-intercept of y = $\frac{-4}{3}$.

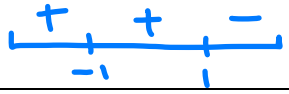
$\frac{(x+1)(x+4)}{3(x+1)(x-1)}$

To advance in the circuit, find the product of the five answers. $\frac{-16}{9}$

# 14 Answer: $-3$

Consider the rational function, $q(x) = \frac{(x^2+2x+1)}{(1-x)}$. Find the interval $(a, b)$ on which $q(x) \geq 0$.

$q(x) = \frac{(x+1)(x+1)}{(1-x)}$




$a = -\infty$

To advance in the circuit, search for $a$.

# 2 Answer: 3

A polynomial function, $p$, has one real zero and two non-real zeros. The real zero is –2 and one of the non-real zeros is $-3+5i$. What is the other non-real zero in $a+bi$ form? $-3-5i$

$-3-5 = -8$

To advance in the circuit, find the sum of $a$ and $b$ for the non-real zero you found.

# 16 Answer: $2\sqrt{3}$

Solve the equation $\sin 2\theta = \cos\theta$ for $0 \leq \theta < 2\pi$. There are multiple answers. Check your answers with your teacher and then advance to the answer choice −1.

$2\sin\theta\cos\theta = \cos\theta$ $\quad 2\sin\theta = 1$ or $\cos\theta = 0$

$\theta = \frac{\pi}{6}, \frac{5\pi}{6}$ $\quad \theta = \frac{\pi}{2}, \frac{3\pi}{2}$

$\theta = \frac{\pi}{6}, \frac{5\pi}{6}, \frac{\pi}{2}, \frac{3\pi}{2}$

# 4 Answer: $\infty$

A polynomial function $p$ is given by $p(x) = (x^2 - x - 2)(x^2 - 9x)$. List the zeros of the function.

To advance in the circuit, find the sum of the zeros.

$p(x) = (x-2)(x+1)x(x-9)$ $\quad 2 + -1 + 0 + 9$

10

Math Medic

# 15 — Answer: $-\infty$

The complex number represented by

$$4\cos\left(-\frac{\pi}{6}\right)+i(4\sin\left(-\frac{\pi}{6}\right)$$

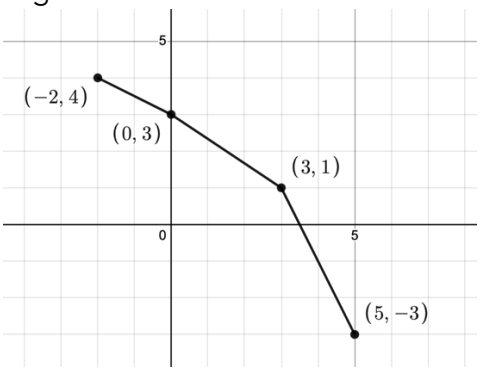
has the polar coordinates $(r,\theta)$and the rectangular coordinates $(a,b)$. Find both representations of the complex number and then to advance in the circuit, find the $a$-coordinate.

$r=4,\ \theta=-\frac{\pi}{6}$

$a=4\cdot\frac{\sqrt{3}}{2}=\boxed{2\sqrt{3}}$ $b=4\cdot\frac{-1}{2}=-2$

# 12 — Answer: 1

The piecewise function, $f$, consisting of three line segments is shown.




$-2$

The function, $g$, not pictured, is the inverse of $f$. What is the minimum value of $g$?

Domain of $f$ = Range of $g$

# 5 — Answer: 10

Consider the function $f(x)=e^x$. As $x$ decreases without bound, $f(x)$ tends towards 0 .

# 3 — Answer: $-8$

odd

$\lim_{x\to-\infty}(-0.5x^7+6x^5-12x^4+x)=\infty$

neg.

# 8 — Answer: $-\frac{16}{9}$

$6(\sin^2x+\cos^2x)=6$

Let $g(x)=6\sin^2x+\ln\sqrt{x}+6\cos^2x+\tan\left(\frac{3\pi}{4e}x\right)$.

What is $g(e)$?

$g(e)=6+\ln\sqrt{e}+\tan\left(\frac{3\pi}{4}\right)$

$=6+\frac{1}{2}+-1=5+\frac{1}{2}=\frac{11}{2}$

# 10 — Answer: 5

What is the period of $h(t)=4\sin\left(\frac{\pi}{3}t\right)+5$?

$\frac{2\pi}{(\pi/3)}=6$

# 13 — Answer: $-2$

The expression $6\log\sqrt[3]{x}+5\log\frac{1}{y}$ can be written as $\log x^ay^b$. What are the values of $a$ and $b$ ?

$\log\left(x^{\frac{1}{3}}\right)^6+\log\left(y^{-1}\right)^5$

$a=2$ $b=-5$

To advance in the circuit, find the sum of $a$ and $b$.

$2-5=-3$

# 6 — Answer: 0

The function $g(x)=6\cdot7^{2x}+5\cdot49^x$ can be written in the form $g(x)=a\cdot b^x$.

The value of $a$ is 11 and the value of $b$ is 49.

$6\cdot49^x+5\cdot49^x=11\cdot49^x$

To advance in the circuit, find $b-a$. $49-11=38$

# 11 — Answer: 6

What is the minimum value of $h(t)=4\sin\left(\frac{\pi}{3}t\right)+5$?

$5-4=1$