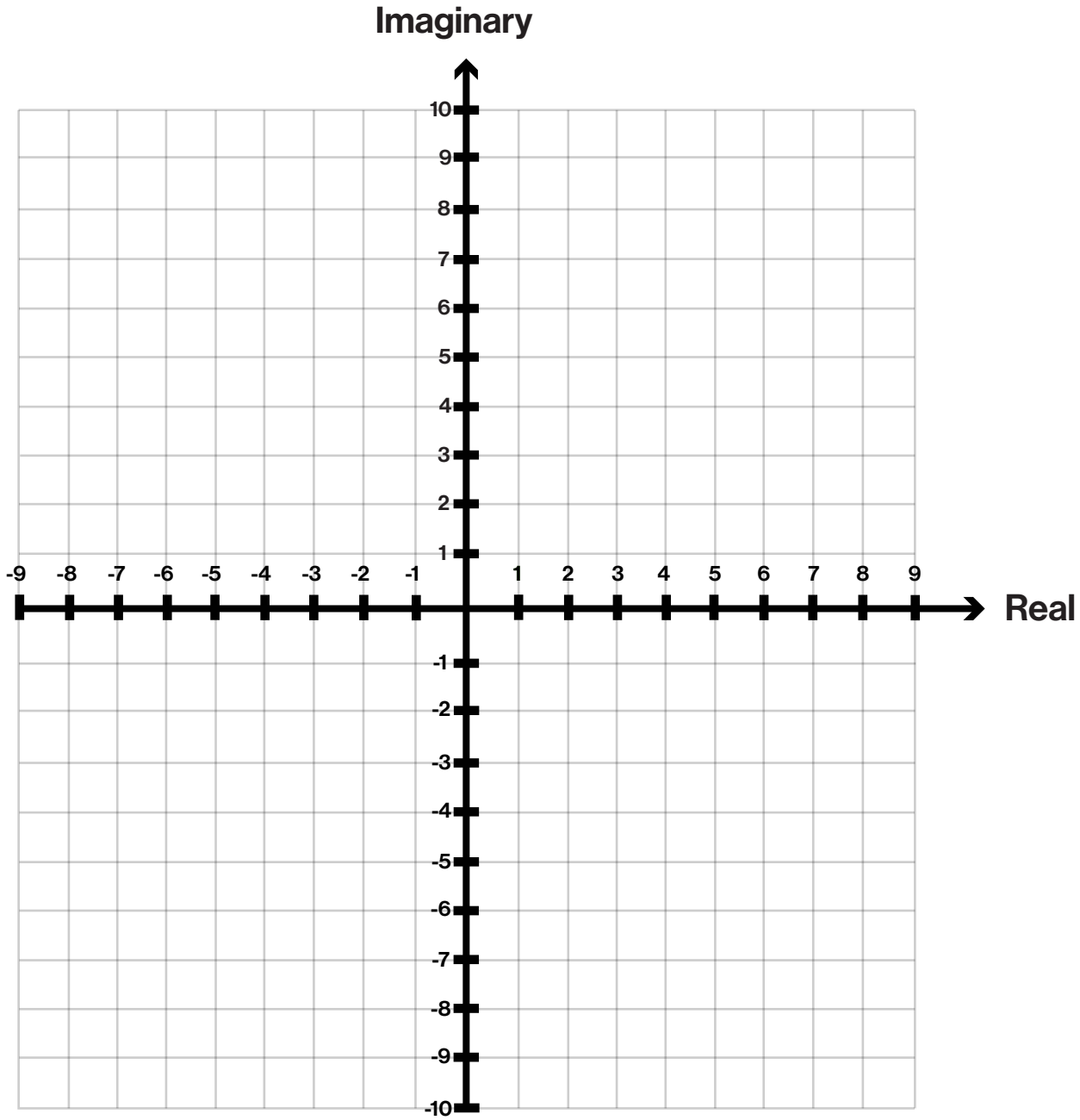
# Complex Numbers (Trigonometric Notation)

Name: _____ Date: _____

## Question 1

Graph

I. $4 + 3i$ II. $i$ III. $-5 - 2i$

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# Complex Numbers (Trigonometric Notation)

## Question 2

Convert to trigonometric notation

I. $-10\sqrt{3} + 10i$

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# Complex Numbers (Trigonometric Notation)

## Question 3

Solve

I. $(3\sqrt{3} - 3i)(2i)$

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# Complex Numbers (Trigonometric Notation)

## Question 4

Solve

I. $\dfrac{2\sqrt{3}-2i}{1+\sqrt{3}i}$

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# Complex Numbers (Trigonometric Notation)

## Question 5

Solve

I. $[3(\cos 20° + i \sin 20°)]^3$

## Question 6

Solve

I. $[64(\cos 270° + i \sin 270°)]^{1/3}$

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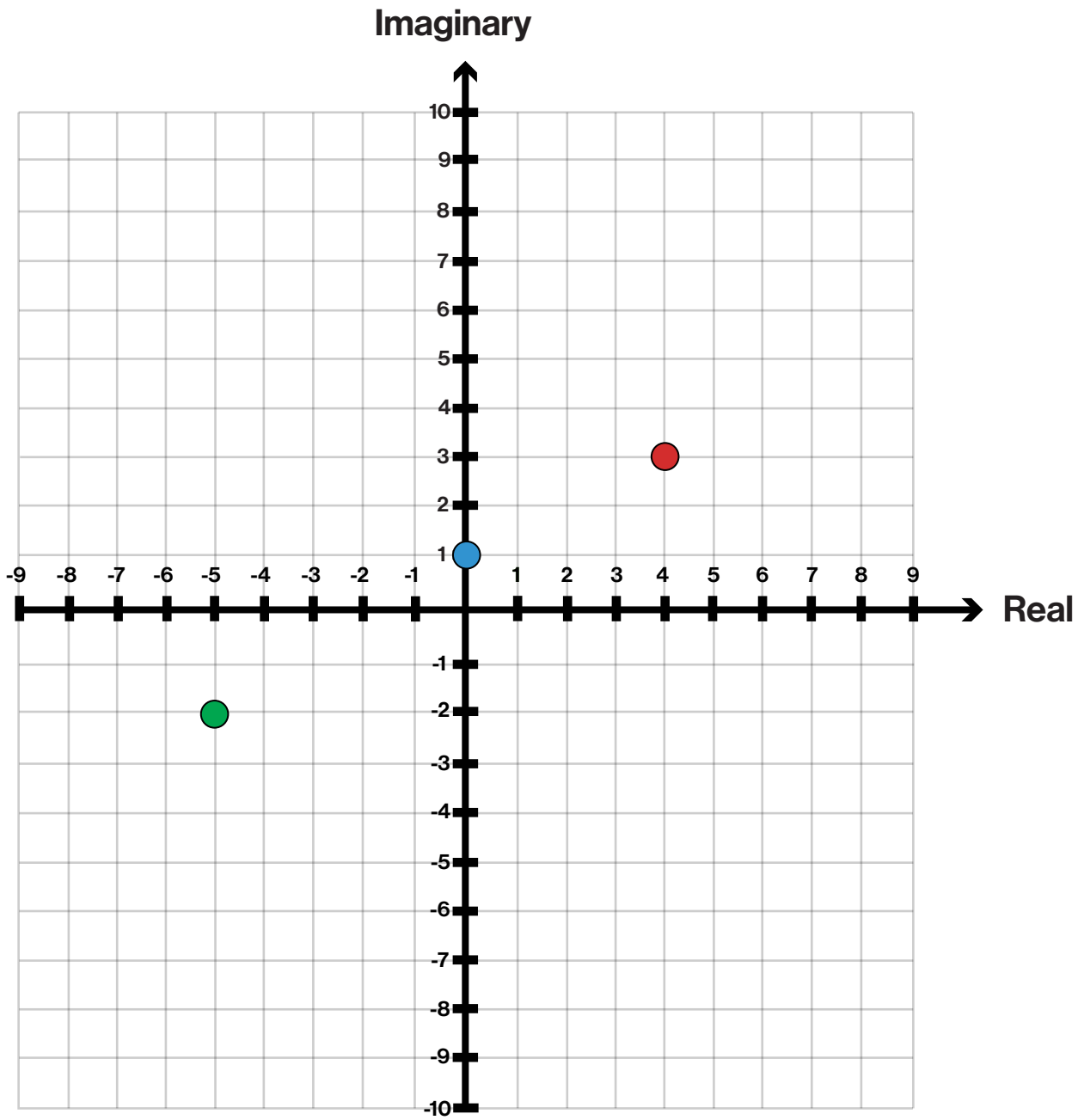
# Complex Numbers (Trigonometric Notation)

Name: **Key** Date: _____

## Question 1

Graph

I. $4+3i$ → $(4,3)$ II. $i$ → $(0,1)$ III. $-5-2i$ → $(-5,-2)$

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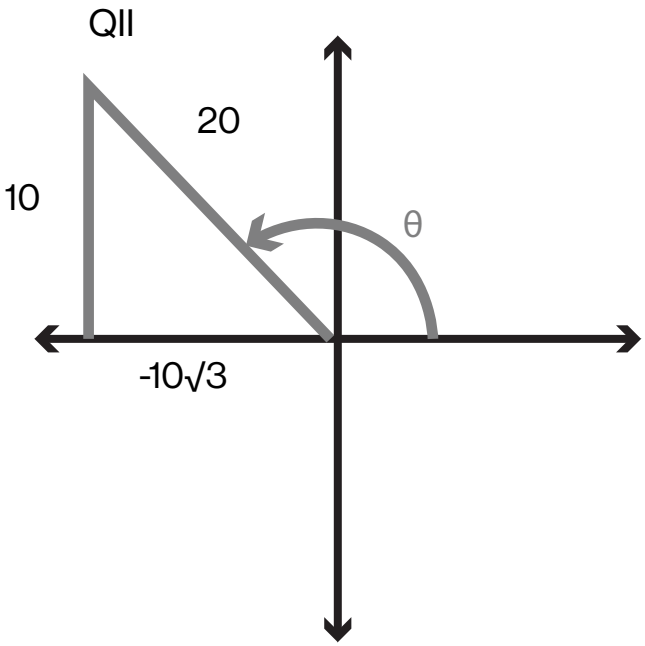
# Complex Numbers (Trigonometric Notation)

## Question 2

Convert to trigonometric notation

I. $-10\sqrt{3} + 10i \rightarrow (-10\sqrt{3}, 10)$

$$\sqrt{(-10\sqrt{3})^2 + (10)^2} = 20$$




$$\cos^{-1}\left(\frac{-10\sqrt{3}}{20}\right) = 150° \quad \text{QII}$$

$$\sin^{-1}\left(\frac{10}{20}\right) = 30° \quad \text{QI}$$

$$\downarrow$$

$$180° - 30° = 150° \quad \text{QII}$$

$$-10\sqrt{3} + 10i = 20(\cos 150° + i \sin 150°)$$

Graphing Calculator Check

$$20(\cos 150° + i \sin 150°) \rightarrow -10\sqrt{3} + 10i$$

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# Complex Numbers (Trigonometric Notation)

## Question 3

Solve

I. $(3\sqrt{3} - 3i)(2i)$

$(3\sqrt{3}, -3)$

$\sqrt{(3\sqrt{3})^2 + (-3)^2} = 6$

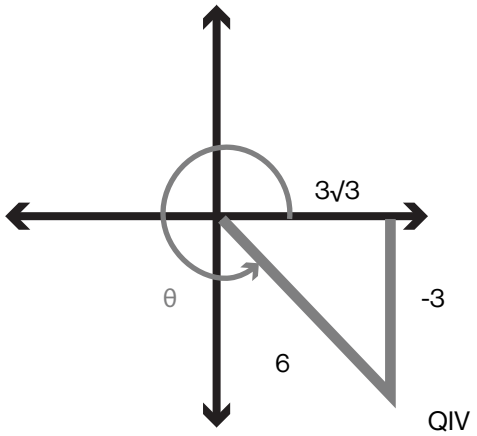
$\cos^{-1}\left(\frac{3\sqrt{3}}{6}\right) = 30°$ QI

$360° - 30° = 330°$ QIV

$\sin^{-1}\left(\frac{-3}{6}\right) = -30°$ QIV

negative

$360° + -30° = 330°$ QIV




$3\sqrt{3} - 3i = 6(\cos 330° + i \sin 330°)$

Graphing Calculator Check

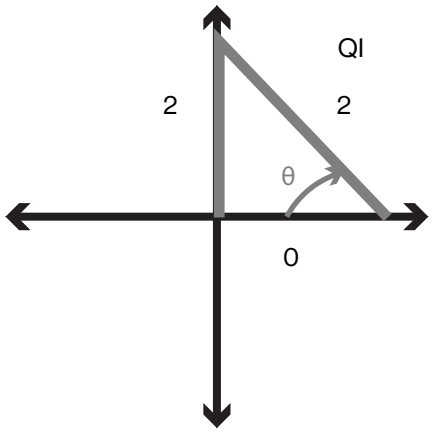
$6(\cos 330° + i \sin 330°) \rightarrow 3\sqrt{3} - 3i$

$(0, 2)$

$\sqrt{(0)^2 + (2)^2} = 2$

$\cos^{-1}\left(\frac{0}{2}\right) = 90°$ QI

$\sin^{-1}\left(\frac{2}{2}\right) = 90°$ QI




$2i = 2(\cos 90° + i \sin 90°)$

Graphing Calculator Check

$2(\cos 90° + i \sin 90°) \rightarrow 2i$

$6 \cdot 2[\cos(330° + 90°) + i \sin(330° + 90°)] \rightarrow 6 + 6\sqrt{3}i$

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# Complex Numbers (Trigonometric Notation)

## Question 4

Solve

I. $\dfrac{2\sqrt{3}-2i}{1+\sqrt{3}i}$

$(2\sqrt{3}, -2)$

$\sqrt{(2\sqrt{3})^2 + (-2)^2} = 4$

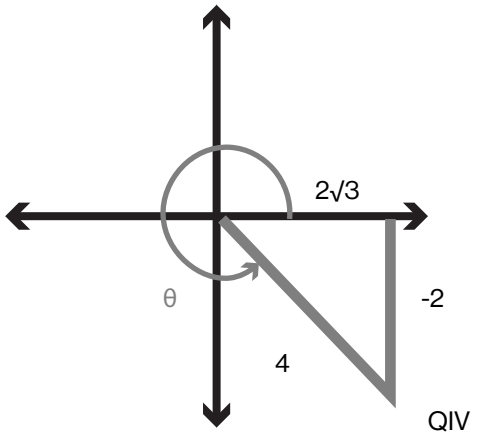
$\cos^{-1}\left(\dfrac{2\sqrt{3}}{4}\right) = 30°$ QI

$360° - 30° = 330°$ QIV

$\sin^{-1}\left(\dfrac{-2}{4}\right) = -30°$ QIV

negative

$360° + -30° = 330°$ QIV




$2\sqrt{3} - 2i = 4(\cos 330° + i \sin 330°)$

Graphing Calculator Check

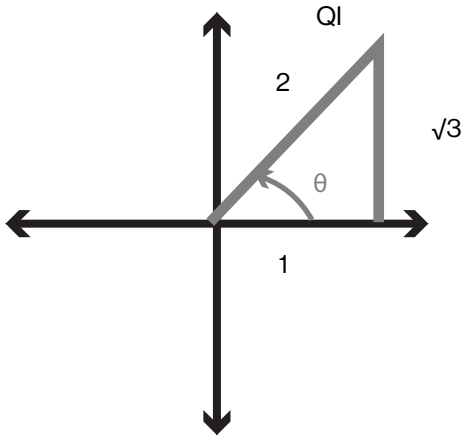
$4(\cos 330° + i \sin 330°) \rightarrow 2\sqrt{3} - 2i$

$(1, \sqrt{3})$

$\sqrt{(1)^2 + (\sqrt{3})^2} = 2$

$\cos^{-1}\left(\dfrac{1}{2}\right) = 60°$ QI

$\sin^{-1}\left(\dfrac{\sqrt{3}}{2}\right) = 60°$ QI




$1+\sqrt{3}i = 2(\cos 60° + i \sin 60°)$

Graphing Calculator Check

$2(\cos 60° + i \sin 60°) \rightarrow 1+\sqrt{3}i$

$\dfrac{4}{2}[\cos(330° - 60°) + i \sin(330° - 60°)] \rightarrow -2i$

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# Complex Numbers (Trigonometric Notation)

## Question 5

Solve

I. $[3(\cos 20° + i \sin 20°)]^3$

$$3^3[\cos(3 \cdot 20°) + i \sin(3 \cdot 20°)] \rightarrow 27(\cos 60° + i \sin 60°) \rightarrow \frac{27}{2} + \frac{27\sqrt{3}}{2} i$$

## Question 6

Solve

I. $[64(\cos 270° + i \sin 270°)]^{1/3}$

root 1:

$$64^{1/3}\left[\cos\left(\frac{270°}{3} + 2 \cdot \frac{360°}{3}\right) + i \sin\left(\frac{270°}{3} + 2 \cdot \frac{360°}{3}\right)\right] = 2\sqrt{3} - 2i$$

root 2:

$$64^{1/3}\left[\cos\left(\frac{270°}{3} + 1 \cdot \frac{360°}{3}\right) + i \sin\left(\frac{270°}{3} + 1 \cdot \frac{360°}{3}\right)\right] = -2\sqrt{3} - 2i$$

root 3:

$$64^{1/3}\left[\cos\left(\frac{270°}{3} + 0 \cdot \frac{360°}{3}\right) + i \sin\left(\frac{270°}{3} + 0 \cdot \frac{360°}{3}\right)\right] = 4i$$

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