Exam 2 Test Prep

Degrees to Radians

Multiply the degree by π/180

Radians to degrees

Multiply Radian by 180/ π

1.What is 120° in radians?

$\frac{120}{1} \cdot \frac{\pi}{180} = \frac{2\pi}{3}$

2. What is 330° in radians

$\frac{330}{1} \cdot \frac{\pi}{180} = \frac{11\pi}{6}$

3. What is 225° in radians

$\frac{225}{1} \cdot \frac{\pi}{180} = \frac{5\pi}{4}$

4.What is 7π/4 in degrees

$\frac{7\pi}{4} \cdot \frac{180}{\pi} = 315°$

5.What is 3π/4 in degrees

$\frac{3\pi}{4} \cdot \frac{180}{\pi} = 135°$

6.What is π/3 in degrees

$\frac{\pi}{3} \cdot \frac{180}{\pi} = 60°$

Arc Length

Formula: $S = r \times \theta$

*Theta HAS to be in RADIANS

7. If a circle has a radius of 18.20cm find the arc length of the two degrees below.

A) 7π/4

$\frac{7\pi}{4} \cdot \frac{18.20}{1}$

$= 100.06\text{cm}$

B) 270°

$\frac{270}{1} \cdot \frac{\pi}{180} = \frac{3\pi}{2}$

$S = 18.20 \cdot \frac{3\pi}{2}$

$S = 85.77\text{cm}$

C) 3π/2

$S = 18.20 \cdot \frac{3\pi}{2}$

$= 85.77\text{cm}$

Area of a Sector Formula:

$A = \frac{1}{2} r^2 \theta = \frac{r^2\theta}{2}$

* Theta HAS to be in RADIANS

8. If a circle has a radius of 26.75inch, what is the Area of the sector if is θ=15°?

$\frac{15}{1} \cdot \frac{\pi}{180} = \frac{\pi}{12}$

$A = \frac{1}{2}(26.75)^2 \cdot \frac{\pi}{12}$

$\downarrow$

$\frac{715.56}{1} \cdot \frac{\pi}{12} = \frac{187.33}{2}$

$A = 93.67 \text{inch}^2$

9. If a circle has a diameter of 72.45cm, what is the area of the sector if is θ=35°?

$\frac{72.45}{2} = r$

$= 36.23\text{cm}$

$A = \frac{1}{2}(36.23)^2 \cdot \frac{7\pi}{36}$

$\downarrow$

$\frac{1312.61}{1} \cdot \frac{7\pi}{36}$

$\frac{35}{1} \cdot \frac{\pi}{180} = \frac{7\pi}{36}$

$\downarrow$

$\frac{801.83}{2} = 400.91\text{cm}^2$

Angular Speed: $\omega = \theta/t$

10. A wheel completes 135 revolutions in 1 minute. What is its angular speed in radians per second?

$\to 0 \quad \to T$

$2\pi = 360°$

$135 \cdot 2\pi = \frac{270\pi}{60s} = 4.5\pi \text{ rad/s}$

- revolution: Going around a circle

θ $T = 1\,min \rightarrow rads/sec$

11. A fan blade rotates at 600 revolutions per minute (rpm). What is its angular speed in radians per second?

$$600 \cdot 2\pi = \frac{1200\pi}{60} = 20\pi \text{ rad/s}$$

12. A car tire with a radius of 0.5 meters is rolling without slipping at a linear speed of 20 m/s. What is the angular speed of the tire?

$r = 0.5m$

$$V = \frac{d}{T} \rightarrow V = rw$$

$$\frac{V}{r} = \frac{rw}{r} \rightarrow w = \frac{V}{r} = \frac{20}{0.5} = 40 \text{ rad/s}$$

↳ angular Speed

Linear Speed: $v = d/t$ or $v = \omega r$

13. A cyclist travels 120 meters ($\rightarrow d$) in 20 seconds ($\rightarrow t$). What is the cyclist's linear speed?

$V = m/s$ $\quad V = \frac{120}{20} = 60 m/s$

14. A wheel with a radius of 0.6 meters is spinning at an angular speed of $\omega = 12 rad/s$. What is the linear speed of a point on the edge of the wheel?

$V = \omega r \qquad V = 12 \cdot 0.6 = 7.2 \, m/s$

15. A Ferris wheel with a radius of 12 meters makes one complete revolution every 30 seconds. What is the linear speed of a seat on the edge?

$\rightarrow 2\pi$

$V = \omega r \qquad \omega = \frac{2\pi}{30} = \frac{\pi}{15} \, rad/s$

$V = \frac{\pi}{15} \cdot 12 = \frac{12\pi}{15} \rightarrow \frac{4\pi}{5} \approx 2,51 \, m/s$

Sin & CSC Positive QII

Tan & Cot Positive

Finding Trig Values:

16. What are the three trig functions at 5π/6?

Qi = Sin, Cos, Tan → Positive

Students	All
QIII Take	Calculus QII

Cos & Sec → Positive

$Sin = \frac{1}{2} \qquad Cos = \frac{-\sqrt{3}}{2} \quad QII$

$Tan = \frac{y}{x} \rightarrow \frac{1}{2} \div \frac{-\sqrt{3}}{2}$

$\hookrightarrow \frac{1}{2} \cdot \frac{2}{-\sqrt{3}} = \frac{-2}{2\sqrt{3}} = \frac{1 \cdot \sqrt{3}}{\sqrt{3} \cdot \sqrt{3}}$

$= \frac{\sqrt{3}}{3}$

17. What are the three trig functions of 4π/3? QIII

$Sin = - \qquad Cos = - \qquad Tan = +$

$Sin = \frac{-\sqrt{3}}{2} \qquad Cos = \frac{-1}{2}$

$Tan = \frac{-\sqrt{3}}{2} \div \frac{-1}{2}$

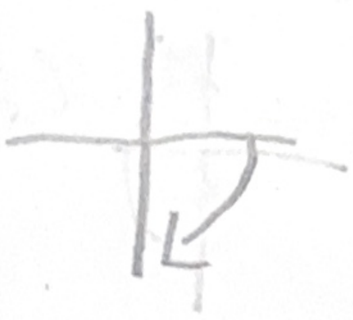
$\hookrightarrow \frac{-\sqrt{3}}{2} \cdot \frac{-2}{1} = \frac{2\sqrt{3}}{2} = \sqrt{3}$

18. What are the three trig functions at π/4? Q1 ALL Positive

$\sin = \frac{\sqrt{2}}{2}$ $\cos = \frac{\sqrt{2}}{2}$

$\tan = \frac{\sqrt{2}/2}{\sqrt{2}/2} = 1$

19. What are the three trig functions at -π/3?



$360 - 60 = 300° \rightarrow \frac{5\pi}{3}$ Q IV → cos +

$\sin = -\frac{\sqrt{3}}{2}$ $\cos = \frac{1}{2}$

$\tan = -\frac{\sqrt{3}}{2} \div \frac{1}{2}$

$\hookrightarrow -\frac{\sqrt{3}}{2} \cdot \frac{2}{1} = -\sqrt{3}$

20. What are the three trig functions at -2π/3?

$360 - 120 = 240°$ Q III → tan +

$\sin = -\frac{\sqrt{3}}{2}$ $\cos = -\frac{1}{2}$

$\tan = -\frac{\sqrt{3}}{2} \div -\frac{1}{2}$

$\hookrightarrow -\frac{\sqrt{3}}{2} \cdot -\frac{2}{1} = \sqrt{3}$

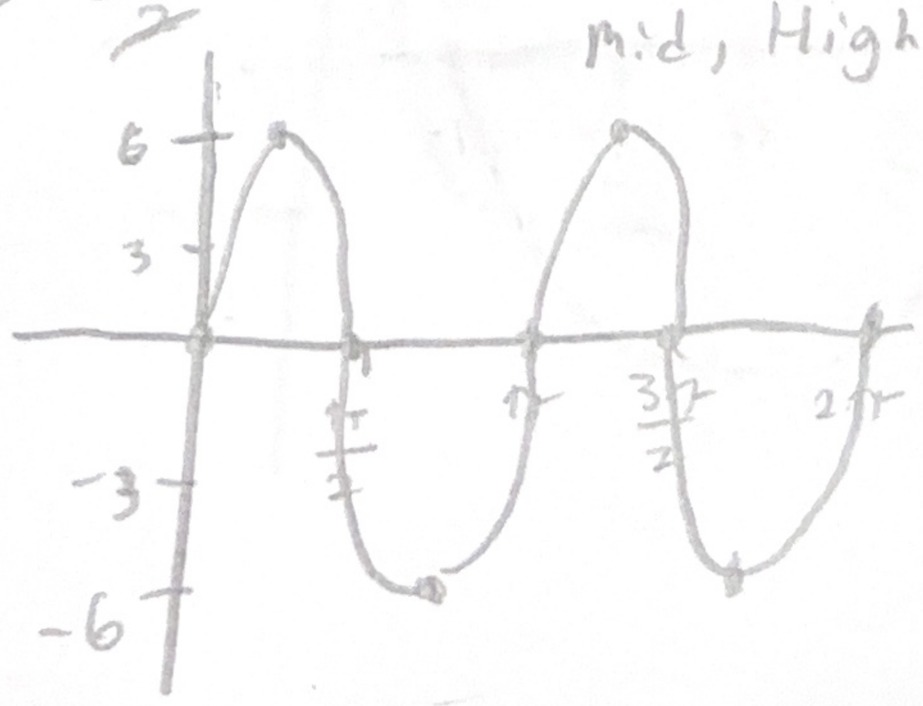
Graph Sin, Cos and Tan

21. y=6sin(2x) $y = a\sin(bx + d) + c$

a = 6 → vertical stretch or amplitude

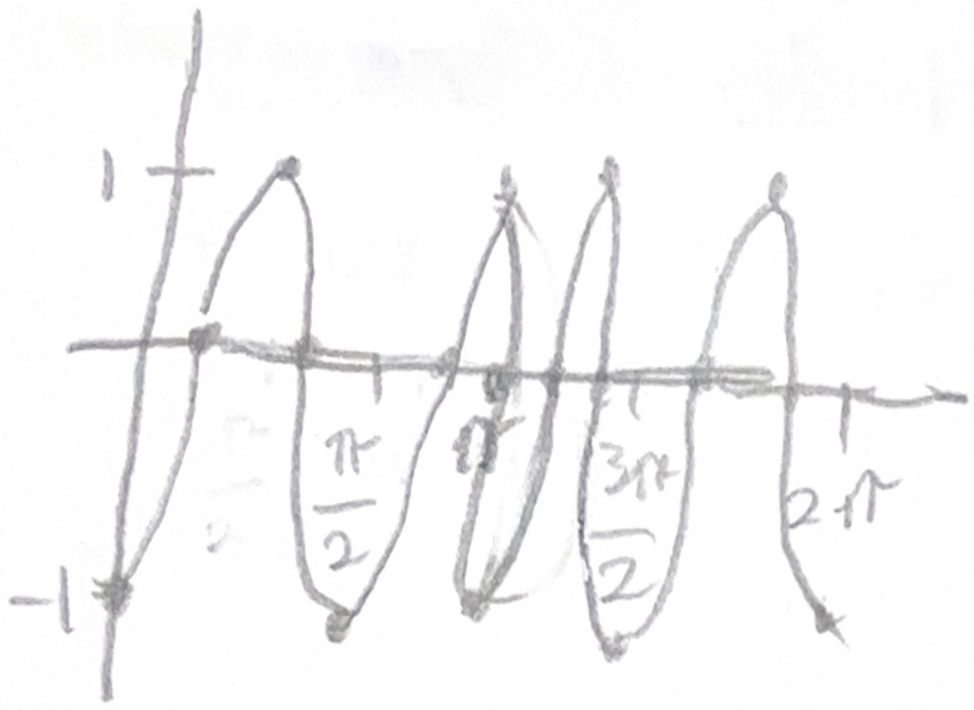
b = 2 → $\frac{2\pi}{b}$ → $\frac{2\pi}{2} = \pi$ (Period → Horizontal Compression)

mid, High, mid, low, mid



22. y= -cos(4x)

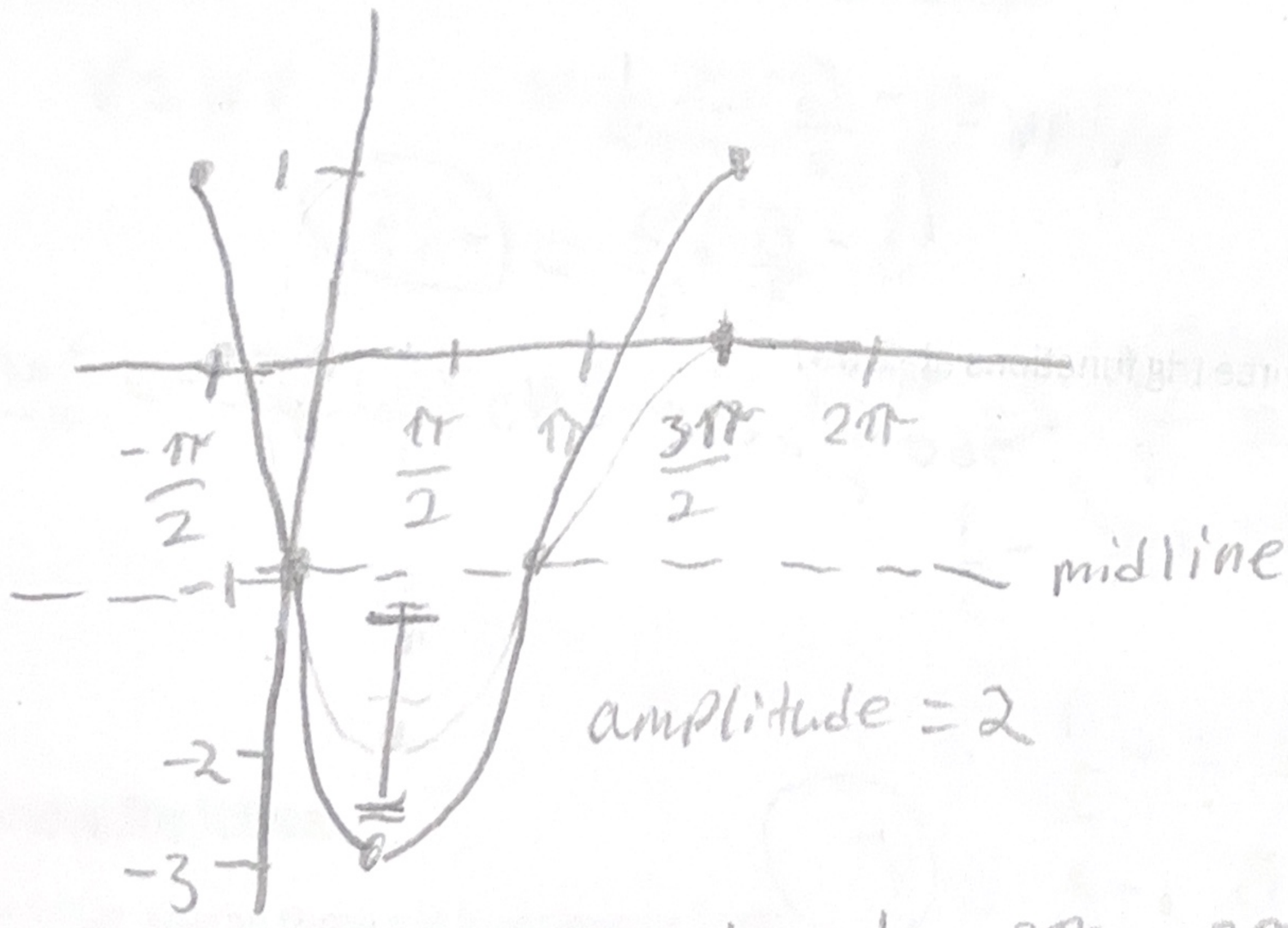
$a=1 \quad b=4x \Rightarrow \frac{2\pi}{b} = \frac{2\pi}{4} \rightarrow \frac{\pi}{2}$



High, mid, low, mid, High
↳ low, mid, high, mid, low

23. y=2cos(x+ π/2) -1

$a=2 \quad b=1 \rightarrow 2\pi \quad d=\text{Left} \frac{\pi}{2} \quad c=\text{Down}$ -1

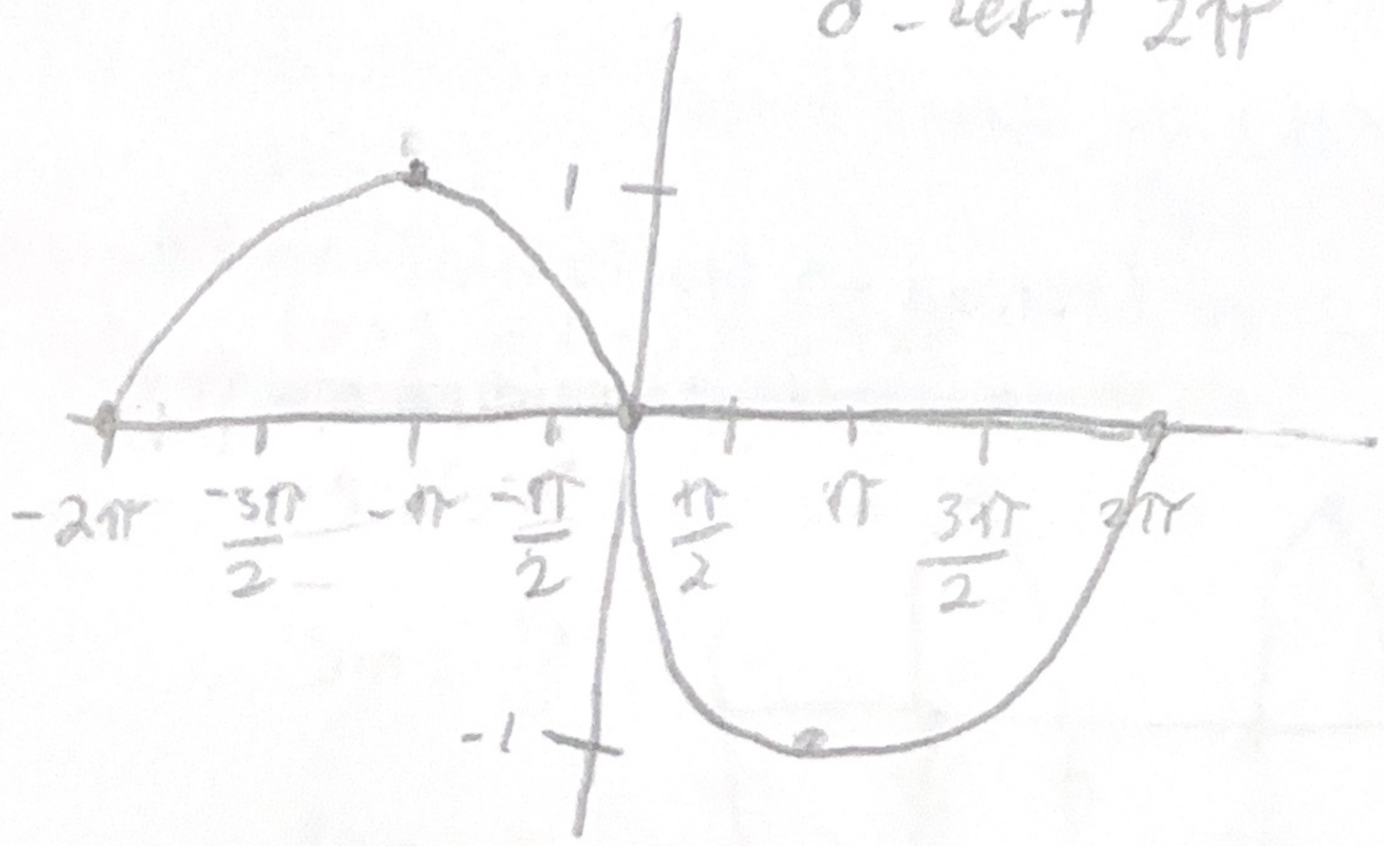


24. y=sin1/2(x +2π)

$a=1 \quad b=\frac{1}{2} \rightarrow \frac{2\pi}{b} \rightarrow \frac{2\pi}{1} \div \frac{1}{2}$

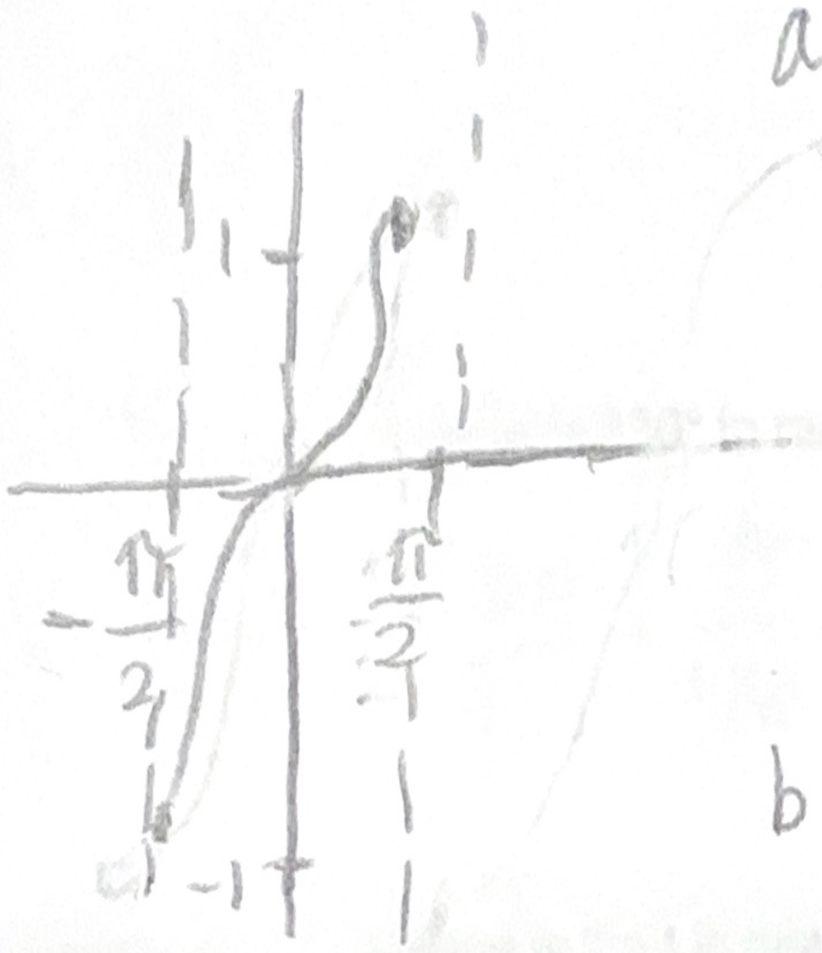
$d=\text{Left } 2\pi$

↳ $\frac{2\pi}{1} \times \frac{2}{1} = 4\pi$ ← Horizontal Stretch



Low, mid, high

25. y=tanx



a = No Amplitude

Vertical asymptote

- Graph will never touch V-asymp

b = A normal period for tanx = π

26. Y=-2tan(1/2x)

Vertical stretch = 2

Period = $\frac{\pi}{b}$ → $\frac{\pi}{1} \div \frac{1}{2}$

↳ $\frac{\pi}{1} \cdot \frac{2}{1} = 2\pi$ (horizontal stretch)

High, mid, low