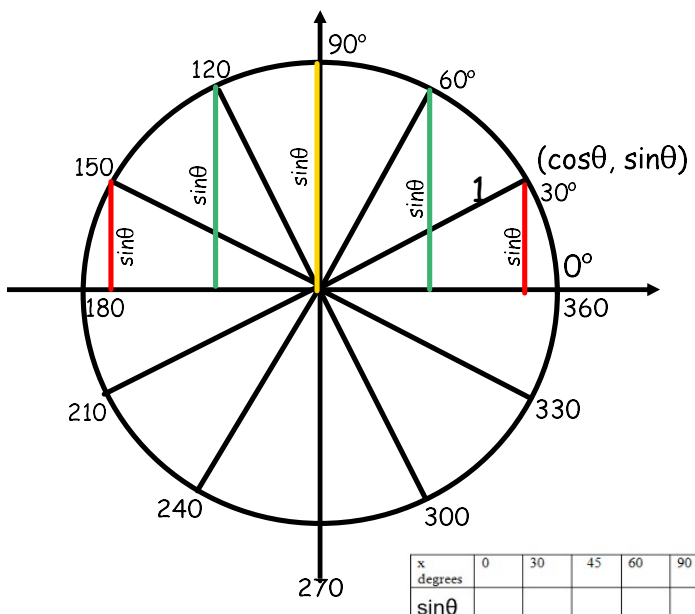
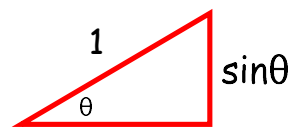
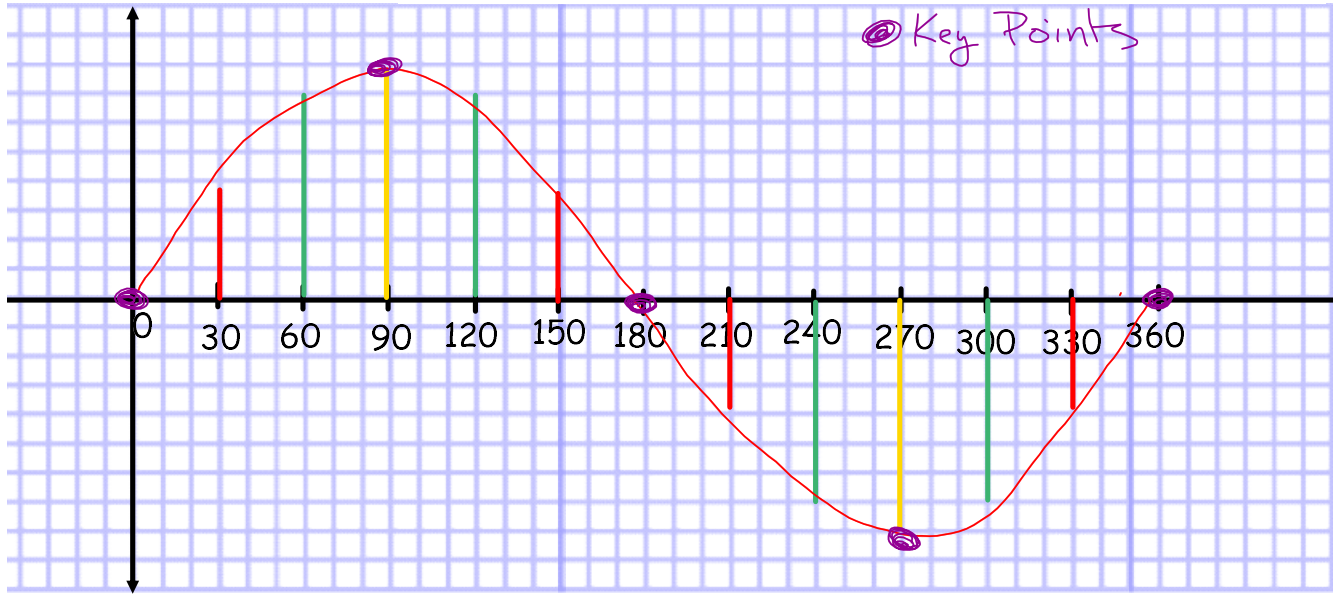


### 5.2 Trigonometric Base Functions

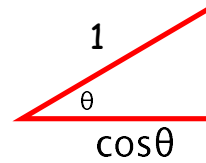
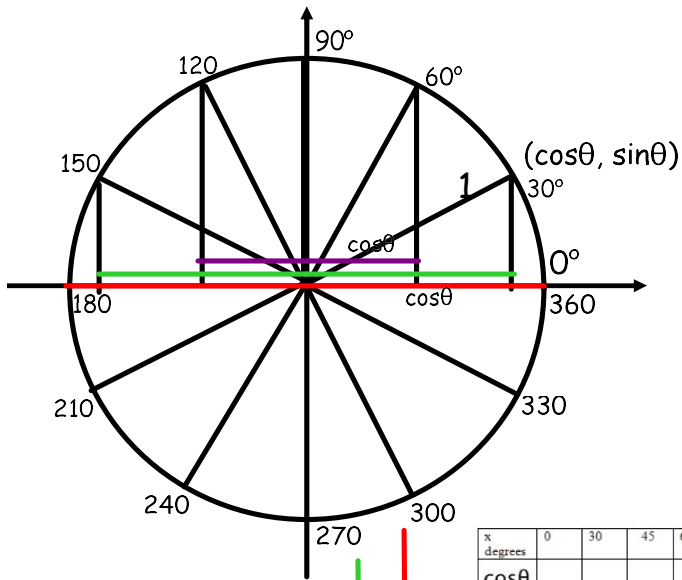
1.  $y = \sin \theta$



| x degrees          | 0 | 30 | 45 | 60 | 90 | 120 | 135 | 150 | 180 | 210 | 225 | 240 | 270 | 300 | 315 | 330 | 360 |
|--------------------|---|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| sin theta (exact)  |   |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |
| sin theta (approx) |   |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |



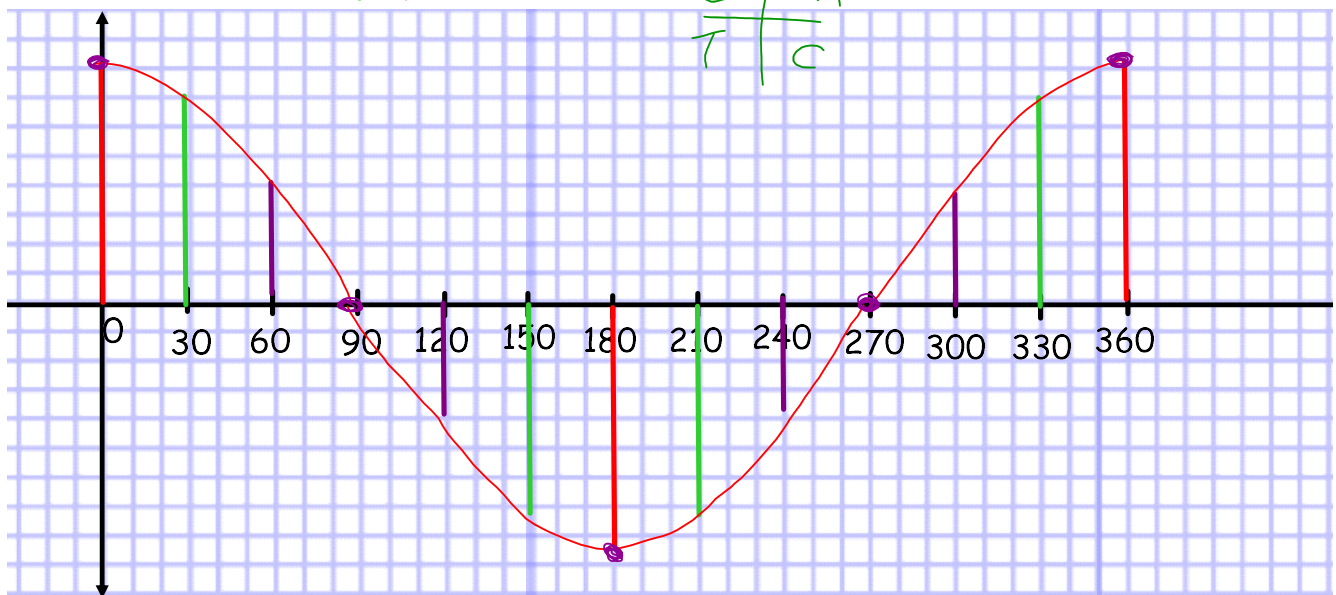
2.  $y = \cos \theta$



| x degrees     | 0 | 30 | 45 | 60 | 90 | 120 | 135 | 150 | 180 | 210 | 225 | 240 | 270 | 300 | 315 | 330 | 360 |
|---------------|---|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| cosθ (exact)  |   |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |
| cosθ (approx) |   |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |

Key Points

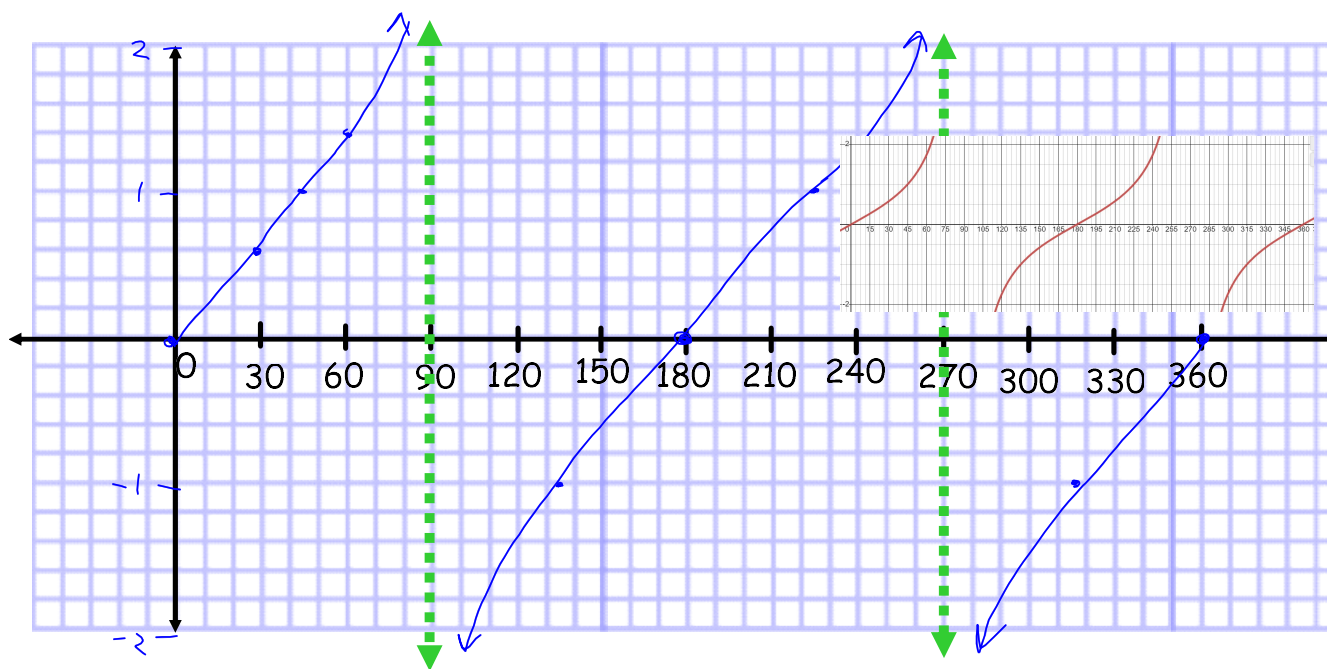
S / A  
T / C



3.  $y = \tan \theta$

recall:  $\tan \theta = \frac{\sin \theta}{\cos \theta}$   $\frac{y}{x}$

| x degrees     | 0 | 30                   | 45 | 60         | 90    | 120         | 135 | 150                   | 180 | 210                  | 225 | 240        | 270   | 300         | 315 | 330                   | 360 |
|---------------|---|----------------------|----|------------|-------|-------------|-----|-----------------------|-----|----------------------|-----|------------|-------|-------------|-----|-----------------------|-----|
| tanx (exact)  | 0 | $\frac{1}{\sqrt{3}}$ | 1  | $\sqrt{3}$ | UNDEF | $-\sqrt{3}$ | -1  | $-\frac{1}{\sqrt{3}}$ | 0   | $\frac{1}{\sqrt{3}}$ | 1   | $\sqrt{3}$ | UNDEF | $-\sqrt{3}$ | -1  | $-\frac{1}{\sqrt{3}}$ | 0   |
| tanx (approx) | 0 | 0.6                  | 1  | 1.7        |       | -1.7        | -1  | -0.6                  | 0   | 0.6                  | 1   | 1.7        |       | -1.7        | -1  | -0.6                  | 0   |



## 4. Properties of the base trigonometric functions.

| Properties  | $y=\sin x$  | $y=\cos x$  | $y=\tan x$  |
|---|---|---|---|
| domain  | $D=\{x \in \mathcal{R}\}$   | $D=\{x \in \mathcal{R}\}$                                 | $D=\{x \in \mathcal{R} / x \neq \dots -90^\circ, 90^\circ, 270^\circ, \dots\}$      |
| range   | $R=\{y \in \mathcal{R} / -1 \leq y \leq 1\}$  | $R=\{y \in \mathcal{R} / -1 \leq y \leq 1\}$              | $R=\{y \in \mathcal{R}\}$   |
| max value   | 1   | 1   | $\infty$  |
| min value   | -1  | -1  | $-\infty$   |
| period  | $360^\circ$   | $360^\circ$   | $180^\circ$   |
| amplitude   | 1   | 1   | $\infty$  |
| x-int   | $\{\dots 0^\circ, 180^\circ, 360^\circ, \dots\}$  | $\{\dots -90^\circ, 90^\circ, 270^\circ, \dots\}$         | $\{\dots 0^\circ, 180^\circ, 360^\circ, \dots\}$                                    |
| y-int   | 0   | 1   | 0   |
| asymptotes  | none  | none  | $x=\{\dots -90^\circ, 90^\circ, 270^\circ, \dots\}$                                 |
| interval of increase<br>$0^\circ \leq x \leq 360^\circ$ | $\{x \in \mathcal{R} / 0^\circ \leq x \leq 90^\circ, 270^\circ \leq x \leq 360^\circ\}$ | $\{x \in \mathcal{R} / 180^\circ \leq x \leq 360^\circ\}$ | $\{x \in \mathcal{R} / 0^\circ \leq x \leq 360^\circ, x \neq 90^\circ, 270^\circ\}$ |
| interval of decrease<br>$0^\circ \leq x \leq 360^\circ$ | $\{x \in \mathcal{R} / 90^\circ \leq x \leq 270^\circ\}$                                | $\{x \in \mathcal{R} / 0^\circ \leq x \leq 180^\circ\}$   | none  |

## Homework



### Part A

For each of the reciprocal functions,  $y = \csc x$ ,  $y = \sec x$ ,  $y = \cot x$ :

- Complete a table of values using special angles (30, 45, 60, 90, etc) and then evaluate the exact and approx value of the function from  $0^\circ \leq x \leq 360^\circ$ . (Use a similar template to our lesson today)
- Graph the functions for  $-360^\circ \leq x \leq 360^\circ$  on separate grids. (Be sure to label asymptote(s), if any, on the graph.)
- State the domain and range of each function.

### Part B

- Do p. 299 # 1, 3, 10, 11