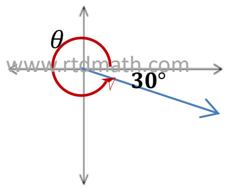
SOLUTIONS **Math 30-1 Trigonometry Practice Exam**

1. First determine quadrant θ terminates in. Since sin is negative in Quad III and IV, and tan is neg. in II and IV, θ is in **quad IV**.



So, $\theta = 360° - 30°$

$= 330°$ **or** $\frac{11\pi}{6}$ *(not one of the choices)*

So, consider co-terminal angles of 330° by adding / subtracting 360° (and converting to radians), or use $\frac{11\pi}{6}$ *and add/subtract* 2π*...*

$= 330° + 360° = 690°$, converts to $\frac{23\pi}{6}$

ANSWER: **D**

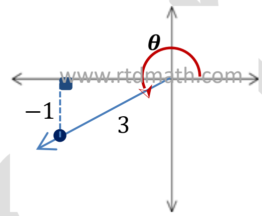
2. This is a reasoning question, not a calculation question! Using CAST rule, since cos is negative in Quad II and III, and tan is neg. in II and IV, θ is in **quad II**.

Which means, θ is between $\frac{\pi}{2}$ and π. (1.57 rads and 3.14 as decimals)

So, the only possible option there is **2.62** (Note, all answers are presumed to be in radians as no unit is specified!)

ANSWER: **B**

NR#1 Since sin is negative in Quad III and IV, and we want the *smallest* option for θ draw an angle in st. pos. in **quad III**.



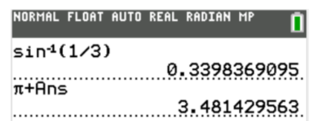
Given:

$sin\theta = \frac{-1}{3}$

First find reference angle, let's call it α *(inside the triangle)*

$\alpha = sin^{-1}\left(\frac{1}{3}\right)$

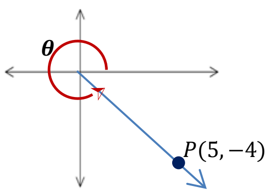
NOTE: When finding reference angles (by definition less than 90° so all trig ratios are positive) **drop any negatives**



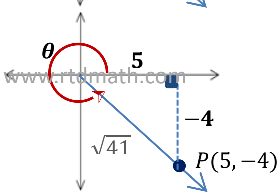
(radian mode)

$\theta \approx 3.5$ ANSWER: **3.5**

3. First determine quadrant θ terminates in. Since sin is negative in Quad III and IV, and tan is neg. in II and IV, θ is in **quad IV**.



Next, plot a point P in quad IV and sketch angle θ

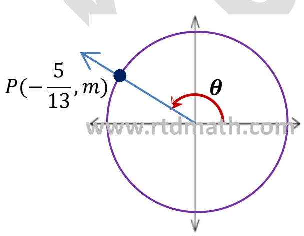


Then make a triangle by connecting P to the x-axis. Label the sides of the triangle from the coordinates of P ... use pyth. theorem to get the hyp.

Now use $sec\theta = \frac{1}{cos\theta}$ where $cos\theta = \frac{adj}{hyp}$....so $sec\theta = \frac{hyp}{adj}$

$sec\theta = \frac{\sqrt{41}}{5}$ ➡ ≈ 1.28 ANSWER: **A**

4. There are two options for $P(-\frac{5}{13}, m)$, it can be drawn in quadrant II or III. *(as the x-coord is negative)* However, it is given that ***tan*** is negative, we know we should draw P in **quad II**. At this point we can pause to consider how fun it is to reason things out like that. *(pause for 10 to 15 seconds)*



🡐 *Diagram of information given*

We can now solve for m by either drawing a triangle and label the hypotenuse 1 (since – unit circle), or by going straight to the unit circle formula:

$$x^2 + y^2 = 1$$

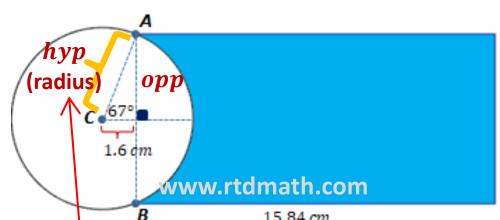
$$(-\frac{5}{13})^2 + m^2 = 1 \Rightarrow m^2 = 1 - \frac{25}{169} \Rightarrow m^2 = \frac{144}{169} \Rightarrow m = \pm\sqrt{\frac{144}{169}}$$

$$\Rightarrow m = \pm\frac{12}{13} \Rightarrow m = \frac{12}{13}$$

Since quad II, use the + version!

ANSWER: **C**

5.



First find the length of :

$cos67° = \frac{1.6}{AC}$ ➡ $AC = \frac{1.6}{cos67°}$ ➡ $AC \approx 4.095$ cm *(radius)*

Next find the length of : *(half of AB is the opp side ...)*

$tan67° = \frac{opp}{1.6}$ ➡ $opp = 1.6tan67°$ ➡ $opp \approx 3.769$

➡ $AB \approx 2 * 3.769$ ➡ $AB \approx 7.539$

Finally find the arc length:

$a = r\theta$ ➡ $a = 4.095 * \frac{(67° * 2)\pi}{180°}$ ➡ $arc \approx 9.577$ **cm**

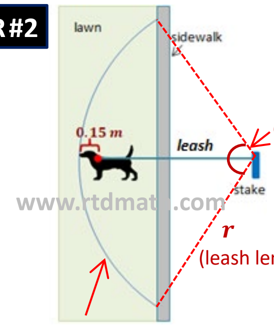
θ in radians

So **perimeter** is: $2 * 15.84 + 7.54 + 9.58$

Rectangle top / bottom
Third rectangle side, AB
Final "side", the arc length

Perimeter $\approx$ **48.8 cm** ANSWER: **C**

NR#2



$\theta = \frac{a}{r}$

$r = \frac{a}{\theta}$ re-arrange

convert θ to radians: $\frac{110°\pi}{180°}$

$r \approx \frac{8.93}{1.92}$

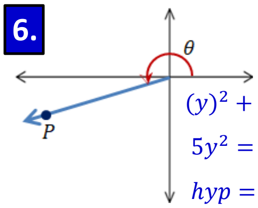
$r \approx 4.65$

So, leash+0.15 $\approx$ **4.65**

Remember, dog's extra reach is included here!

ANSWER: **4.5**

6.



$(y)^2 + (2y)^2 = (hyp)^2$

$5y^2 = (hyp)^2$

$hyp = \sqrt{5}y$

$sec\theta = \frac{\sqrt{5}y}{-2y}$ ← hyp, ← adj

$sec\theta = -\frac{\sqrt{5}}{2}$

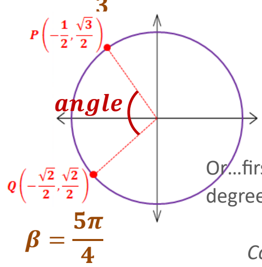
$a = 5$ $b = 2$

ANSWER: **D**

Add: $5 + 2 = 7$

7.

$\theta = \frac{2\pi}{3}$



$\beta = \frac{5\pi}{4}$

$\text{angle between} = \frac{5\pi}{4} - \frac{2\pi}{3}$

$= \frac{15\pi}{12} - \frac{8\pi}{12}$

$= \frac{7\pi}{12}$

Or...first convert to degrees: $= 95°$

Converts to $\frac{7\pi}{12}$

Statement 1 is FALSE

$\theta = \frac{2\pi}{3}$ *Principal angle*

$\theta = \frac{2\pi}{3} - 2\pi$ *Is co-terminal*

$\theta = -\frac{4\pi}{3}$

Statement 2 is TRUE

y-coord at $\frac{2\pi}{3}$ is $sin\theta$

x-coord at $\frac{5\pi}{4}$ is $cos\theta$

Statement 3 is TRUE

$tan\frac{2\pi}{3} = \frac{\frac{\sqrt{3}}{2}}{-\frac{1}{2}}$ ← y, ← x

$= \frac{\sqrt{3}}{2} * \frac{-2}{1}$

$= -\sqrt{3}$

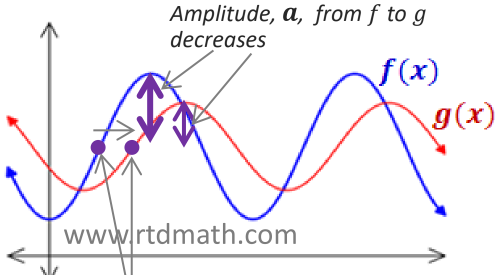
ANSWER: **C**

$cot\frac{5\pi}{4} = \frac{-\frac{\sqrt{2}}{2}}{-\frac{\sqrt{2}}{2}}$ ← x, ← y

$= 1$

Statement 4 is TRUE

8.



ANSWER: **B**

9.

First factor b for horiz. phase shift:

$y = 5\,sin\left[4\left(x + \frac{\pi}{4}\right)\right]$

Period is $\frac{2\pi}{b}$ Phase shift

$= \frac{2\pi}{4}$ ➡ $= \frac{\pi}{2}$ *(to the left, but not relevant)*

ANSWER: **A**

NR#4

$y = 2.3\,sin(0.1208x - 0.3624) + 5.8$

Period is $\frac{2\pi}{b}$

$= \frac{2\pi}{0.1208}$ ➡ $= 52$

MAX is **AMPL + Vert. Shift**

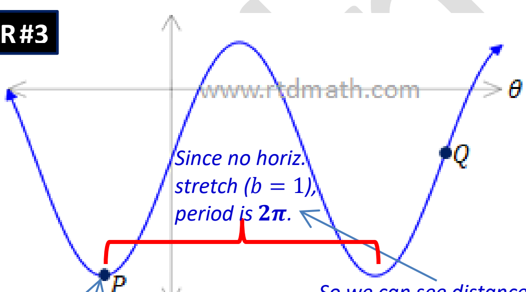
$= a + d$

$= 2.3 + 5.8$

$= 8.1$

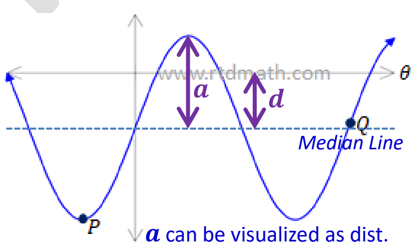
ANSWER: **5281**

NR#3



Basic sine curve (with no horizontal stretch or shift) has a MIN at $x = -\frac{\pi}{2}$:

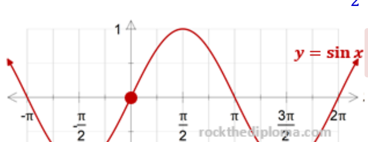
Statement 2 is TRUE



a can be visualized as dist. from MAX (or MIN) to median line

d as dist. from median line to x-intercept

Statement 3 is FALSE



Statement 1 is TRUE

For y-int, set $x = 0$:

But $sin(0) = 0$, so...

$y = a * sin(0) - d$ $\quad y = -d$

Statement 4 is FALSE

For $b < 1$, for example....

$y = a\,sin(2x) - d$

The horiz. str. would be the reciprocal, or here **0.5**

For horiz str < 1, all points move closer to the x-axis ...

Statement 5 is TRUE

ANSWER: **125**

Note: *Mistake on some answer keys*

10.

Domain of $y = tanx$ is $x \neq \frac{\pi}{2} + n\pi$

That is, where $cosx = 0$, since $tanx = \frac{sinx}{cosx}$

... at the top / bottom of the unit circle

So for $y = tan4x$ Hor. Str. of $\frac{1}{4}$

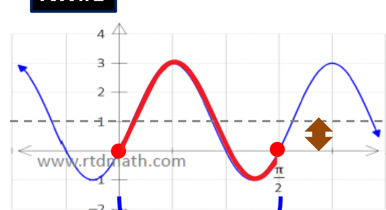
Domain is:

$x \neq \frac{1}{4} * \frac{\pi}{2} + \frac{1}{4} * n\pi$

$x \neq \frac{\pi}{8} + \frac{n\pi}{4}$

ANSWER: **D**

NR#5



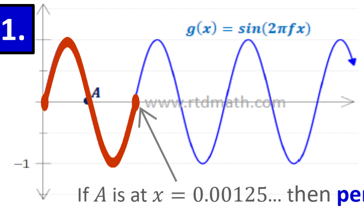
$d = 1$

Period is $\frac{\pi}{2}$ ➡ $b = \frac{2\pi}{\frac{\pi}{2}}$ ➡ $b = 2\pi * \frac{2}{\pi}$

$b = 4$

ANSWER: **41**

11.



If A is at $x = 0.00125$… then **period** is double, $\mathbf{0.0025\ s}$

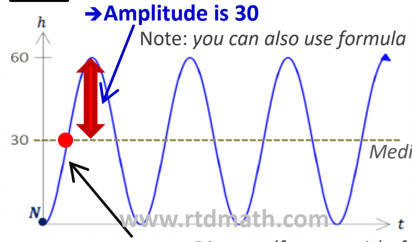
Use $period = \frac{2\pi}{b}$

formula to solve for f: $0.0025\ s = \frac{2\pi}{2\pi f}$ ➡ $\frac{1}{f} = 0.0025\ s$ ➡ $f = \frac{1}{0.0025\ s}$

$f = 400\ Hz$

ANSWER: **D**

12.



➔**Amplitude is 30**

Note: *you can also use formula* $a = \frac{max - min}{2}$

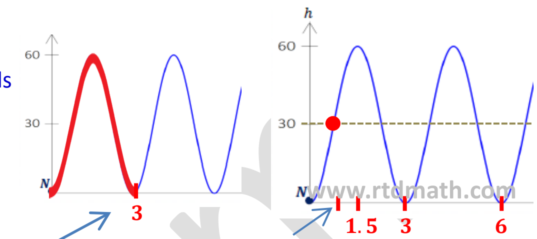
c_{sine} *Distance (from y-axis) of point where curve upswing intersects median line.*

For c_{sine} determine x-coords of max / mins…

20 rotations in 60 sec…. (1 min)

1 rotation in $\frac{60}{20}$

$= \mathbf{3\ sec}$ (this is the **period**)



$c_{sine} = \mathbf{0.75}s$

Halfway between $\mathbf{0}$ *(where min is) and* $\mathbf{1.5}\ s$ *(where max is)*

ANSWER: **A**

13.

Solve by factoring: $2\cos^2\theta + 3\cos\theta - 2 = 0$

$(2\cos\theta \quad)(\cos\theta \quad) = 0$

Two numbers must mult. to -2

$(2\cos\theta - 1)(\cos\theta + 2) = 0$

Now set each factor to zero …

$2\cos\theta - 1 = 0 \quad \cos\theta + 2 = 0$

$\cos\theta = \frac{1}{2}$ or $\cos\theta = -2$

ANSWER: **A**

14.

First isolate trig term: $3\csc^2\theta - 4 = 0$

$3\csc^2\theta = 4$

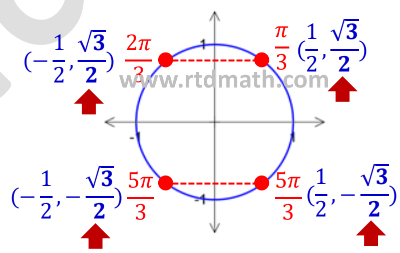
$\csc^2\theta = \frac{4}{3}$

Sq. root both sides $\quad \csc\theta = \pm\sqrt{\frac{4}{3}}$

Since $\sqrt{\frac{a}{b}} = \frac{\sqrt{a}}{\sqrt{b}}$ $\quad \csc\theta = \pm\frac{2}{\sqrt{3}}$

Since $\boldsymbol{\csc\theta}$ is reciprocal of $\boldsymbol{\sin\theta}$ $\quad \sin\theta = \pm\frac{\sqrt{3}}{2}$

Find where on unit circle the y-coord is $\pm\frac{\sqrt{3}}{2}$



$\theta = \frac{\pi}{3}, \frac{2\pi}{3}, \frac{4\pi}{3}, \frac{5\pi}{3}$

ANSWER: **B**

15.

Factor $\sec^2 x - \sec x - 2 = 0$

$(\sec x + 1)(\sec x - 2) = 0$

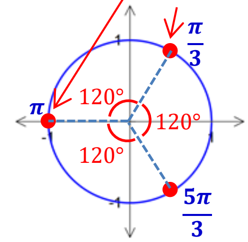
Set each factor to zero:

$\sec x = -1$ or $\sec x = 2$

Since $\boldsymbol{\sec x}$ is reciprocal of :

$\cos x = -1$ or $\cos x = \frac{1}{2}$

Find where on unit circle the $\boldsymbol{x}$-coord is -1 *or* $1/2$



Note that all three solutions are 120°, or $\frac{2\pi}{3}$, apart

$\theta = \frac{\pi}{3} + \frac{2\pi}{3}n$; $n \in I$

first solution — diff between sols

ANSWER: **C**

16.

First isolate and use log laws on LS

$\log_2(\tan x) + \log_2(\cos x) = -1$

$\log_2(\tan x * \cos x) = -1$

Use trig identities to simplify

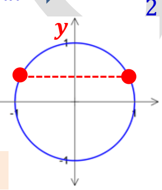
$\log_2\left(\frac{\sin x}{\cos x} * \cos x\right) = -1$

$\log_2(\sin x) = -1$

Convert to log form

$2^{-1} = \sin x$ ➡ $\sin x = \frac{1}{2}$

Find where on unit circle the y-coord is $\frac{1}{2}$



$x = \frac{\pi}{6}$ or $\frac{5\pi}{6}$

ANSWER: **C**

NR#6

First re-write in degrees: $\cos(105°)$

Next find any two standard unit circle angles that add (or subtract) to 105° *Such as:* $\cos(45° + 60°)$

Note: There are many options, another is $\cos(135° - 30°)$

$\cos(\alpha + \beta) = \cos\alpha\cos\beta - \sin\alpha\sin\beta$

$= \cos 45°\cos 60° - \sin 45°\sin 60°$

Finally refer to unit circle and simplify

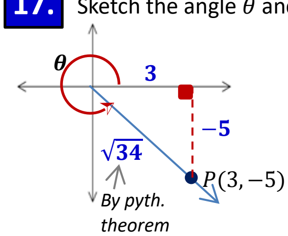
$= \left(\frac{\sqrt{2}}{2}\right)\left(\frac{1}{2}\right) - \left(\frac{\sqrt{2}}{2}\right)\left(\frac{\sqrt{3}}{2}\right)$

$= \frac{\sqrt{2}}{4} - \frac{\sqrt{6}}{4}$ ➡ $= \frac{\sqrt{2} - \sqrt{6}}{4}$

ANSWER: **264**

17.

Sketch the angle θ and draw a triangle to determine trig ratios:



Now, for $\sin(\pi - \theta)$ …

$= \sin\pi\cos\theta - \cos\pi\sin\theta$

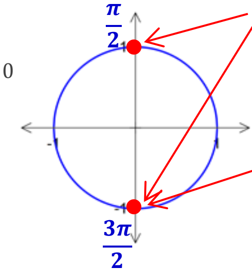
$= (0)\left(\frac{3}{\sqrt{34}}\right) - (-1)\left(\frac{-5}{\sqrt{34}}\right)$ ➡ $= -\frac{5}{\sqrt{34}}$

From unit circle — From diagram $\cos = \frac{adj}{hyp}$

ANSWER: **D**

18. $\dfrac{tanx}{1+sinx}$ Simplifies to ... $\dfrac{\frac{sinx}{cosx}}{1+sinx}$

So, NPVs ... $cosx \neq 0$, $1+sinx \neq 0$



$cosx \neq 0$
Where on the unit circle is the x-coord 0?

$1+sinx \neq 0$
$sinx \neq -1$
Where on the unit circle is the y-coord equal to -1? (already covered above!)

So, NPV at the top / bottom of the unit circle

$x \neq \frac{\pi}{2}$ then every π

Which we write as:

$x \neq \frac{\pi}{2} + n\pi$ where $n \in I$

ANSWER: **C**

NR#7 **Simplify**: $tanx + \dfrac{cosx}{1+sinx}$

$= \dfrac{sinx}{cosx} + \dfrac{cosx}{1+sinx}$

$= \dfrac{sinx(1+sinx)}{cosx(1+sinx)} + \dfrac{cosx(cosx)}{1+sinx(cosx)}$

Pyth. identity, this is "1"

$= \dfrac{sinx + sin^2x + cos^2x}{cosx(1+sinx)}$

$= \dfrac{\cancel{sinx+1}}{cosx(\cancel{1+sinx})}$

$= \dfrac{1}{cosx}$

$= \boldsymbol{secx}$ Code: **4**

Simplify: $\dfrac{cscx}{sinx} + \dfrac{cotx}{tanx}$

$= \dfrac{\frac{1}{sinx}}{sinx} + \dfrac{\frac{cosx}{sinx}}{\frac{sinx}{cosx}}$

$= \dfrac{1}{sinx} * \dfrac{1}{sinx} + \dfrac{cosx}{sinx} * \dfrac{cosx}{sinx}$

$= \dfrac{1}{sin^2x} + \dfrac{cos^2x}{sin^2x}$

$= \dfrac{1+cos^2x}{sin^2x}$

$= \dfrac{sin^2x}{sin^2x}$ ➡ $= \mathbf{1}$ Code: **1**

ANSWER: **41**

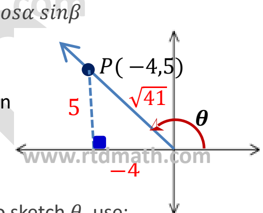
19. Start with appropriate addition / subtraction formula:

$sin(\alpha+\beta) = sin\alpha\, cos\beta + cos\alpha\, sin\beta$

$= sin\frac{\pi}{3}cos\theta + cos\frac{\pi}{3}sin\theta$

Draw θ using info given

Use unit circle for this and $cos\frac{\pi}{3}$



To sketch θ, use:

$cot\theta = -\frac{4}{5}$ ← adj, ← opp

In **Quad II** since adj side is neg and $sin\theta > 0$

Use pyth. theorem for hyp., $(-4)^2 + 5^2 = hyp^2$

so... $cos\theta = \dfrac{-4}{\sqrt{41}}$ $sin\theta = \dfrac{5}{\sqrt{41}}$

$= \left(\dfrac{\sqrt{3}}{2}\right)\left(\dfrac{-4}{\sqrt{41}}\right) + \left(\dfrac{1}{2}\right)\left(\dfrac{5}{\sqrt{41}}\right)$

$= \dfrac{-4\sqrt{3}}{2\sqrt{41}} + \dfrac{5}{2\sqrt{41}}$

$= \dfrac{-4\sqrt{3}+5}{2\sqrt{41}}$

ANSWER: **B**

20. ➡ **Step 1** The mistake is here!

Correct steps:

$\dfrac{1+sinA-(cos^2A-sin^2A)}{cosA+2sinAcosA}$

$= \dfrac{1-cos^2A+sinA+sin^2A}{cosA+2sinAcosA}$

$= \dfrac{sin^2A+sinA+sin^2A}{cosA+2sinAcosA}$

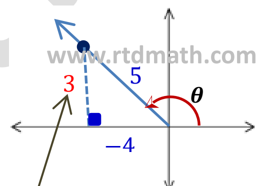
$= \dfrac{2sin^2A+sinA}{cosA+2sinAcosA}$

$= \dfrac{sinA(\cancel{2sinA+1})}{cosA(\cancel{1+2sinA})}$

$= \boldsymbol{tanA}$

ANSWER: **A**

NR#8 Sketch:



By pyth. theorem

So, $tan\theta = -\dfrac{3}{4}$

Formula sheet: $\tan(2\alpha) = \dfrac{2\tan\alpha}{1-\tan^2\alpha}$

$= \dfrac{2\left(-\frac{3}{4}\right)}{1-\left(-\frac{3}{4}\right)^2}$

$= \dfrac{-\frac{6}{4}}{1-\frac{9}{16}}$

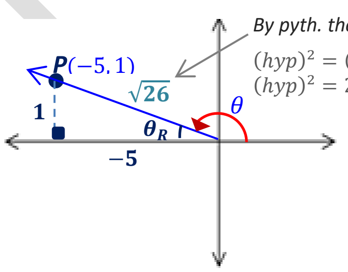
$= \dfrac{-\frac{3}{2}}{\frac{7}{16}}$

$= -\dfrac{3}{2} * \dfrac{16}{7}$ ➡ $= -\dfrac{\mathbf{24}}{\mathbf{7}}$

ANSWER: **247**

Written #1

First bullet



By pyth. theorem:
$(hyp)^2 = (-5)^2 + (1)^2$
$(hyp)^2 = 26$

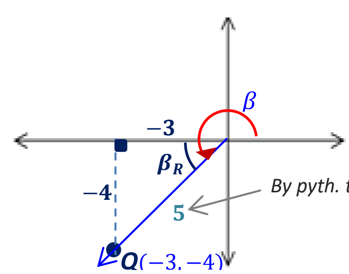
To find $\boldsymbol{\theta}$, first find reference angle $\boldsymbol{\theta_R}$ (inside the triangle)

$\theta_R = tan^{-1}(1/5)$ or $sin^{-1}(1/\sqrt{26})$ or $cos^{-1}(5/\sqrt{26})$

so ...
$\theta \approx 180° - 11°$

$\boldsymbol{\theta \approx 169°}$

```
NORMAL FLOAT AUTO REAL DEGREE MP
tan⁻¹(1/5)
                    11.30993247
180-Ans
                    168.6900675
```



By pyth. theorem:

To find $\boldsymbol{\beta}$, first find reference angle $\boldsymbol{\beta_R}$ (inside the triangle)

$\beta_R = tan^{-1}(4/3)$ or $sin^{-1}(4/5)$ or $cos^{-1}(3/5)$

so ...
$\theta \approx 180° + 53°$

$\boldsymbol{\theta \approx 233°}$

```
NORMAL FLOAT AUTO REAL DEGREE MP
tan⁻¹(4/3)
                    53.13010235
180+Ans
                    233.1301024
```

WR #1

Second bullet

Refer to your formula sheet:
$\sin(\alpha+\beta)=\sin\alpha\cos\beta+\cos\alpha\sin\beta$

We'll need all this: (leave exact)

$\sin\theta=\dfrac{1}{\sqrt{26}}$ ← opp / ← hyp $\quad\cos\theta=\dfrac{-5}{\sqrt{26}}$ ← adj / ← hyp

similarly...

$\sin\beta=\dfrac{-4}{5}\quad\cos\beta=\dfrac{-3}{5}$

So...

$$\sin(\theta+\beta)=\left(\frac{1}{\sqrt{26}}\right)\left(\frac{-3}{5}\right)+\left(\frac{-5}{\sqrt{26}}\right)\left(\frac{-4}{5}\right) \Rightarrow =\frac{-3}{5\sqrt{26}}+\frac{20}{5\sqrt{26}} \Rightarrow =\frac{17}{5\sqrt{26}}$$

***Note:** There was a mistake in some answer keys!*

Written #2

Use $\sin^2\theta+\cos^2\theta=1$, which re-arranges to $\sin^2\theta=1-\cos^2\theta$, to re-write equation in terms of $\cos\theta$ only

First bullet

$2(1-\cos^2\theta)-\cos x-1=0$

$2-2\cos^2\theta-\cos x-1=0$

$0=2\cos^2\theta+\cos x-1 \Rightarrow \mathbf{2\cos^2\theta+\cos x-1=0}$

2nd bullet

$(2\cos\theta\quad)(\cos\theta\quad)=0$ *Factor*

Find two #s that mult to -1, and expression will expand back out to $2\cos^2\theta+\cos x-1$

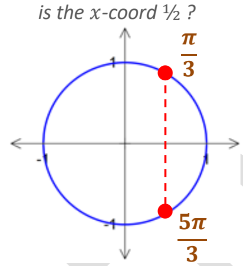
$(2\cos\theta-1)(\cos\theta+1)=0$

Set each factor to zero

$2\cos\theta-1=0$ *or* $\cos\theta+1=0$

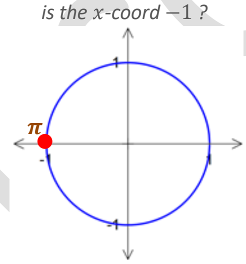
$\cos\theta=1/2$

Where on the unit circle is the x-coord ½ ?



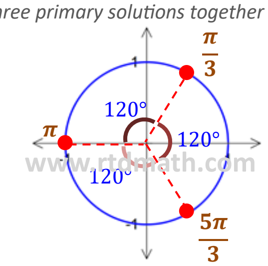
$\cos\theta=-1$

Where on the unit circle is the x-coord -1 ?



PRIMARY SOLUTIONS: $\theta=\dfrac{\pi}{3},\pi,\dfrac{5\pi}{3}$

*For **GENERAL SOLUTION**, consider all three primary solutions together*



They're all $\frac{2\pi}{3}$ (that is, 120°) apart

GENERAL SOLUTION: $\theta=\dfrac{\pi}{3}+\dfrac{2\pi}{3}n\quad n\in I$

Written #3

First bullet

Proceed on left side:

$$=\frac{\frac{1}{\sin x}*\cos x}{\frac{\sin x}{\cos x}+\frac{\cos x}{\sin x}}$$

Write each expression in terms of sin and cos

$$=\frac{\frac{\cos x}{\sin x}}{\frac{\sin x*\sin x}{\cos x*\sin x}+\frac{\cos x*\cos x}{\sin x*\cos x}}$$

Re-write bottom expressions with a common denom.

$$=\frac{\frac{\cos x}{\sin x}}{\frac{\sin^2x+\cos^2x}{\cos x\sin x}}$$

Pyth. identity, this is "1" !

$$=\frac{\cos x}{\sin x}*\frac{\cos x\sin x}{1}$$

Invert and multiply $\Rightarrow$ $=\cos^2x$

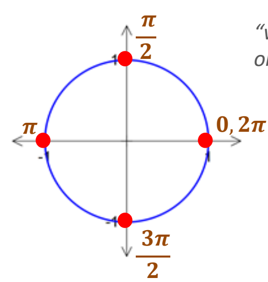
2nd bullet

$$=\frac{\frac{1}{\sin x}*\cos x}{\frac{\sin x}{\cos x}+\frac{\cos x}{\sin x}}$$

Go back to first step, restriction at any expression in the denominator. (Can't divide by 0)

$\sin x\neq 0\qquad \cos x\neq 0$

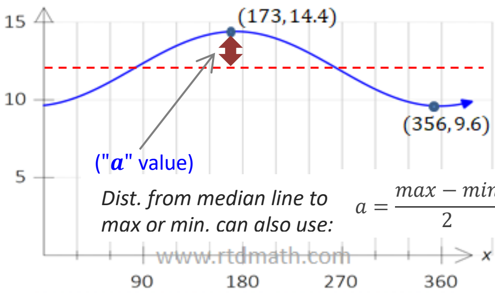
"where on the unit circle is the x or y coord equal to 0 ?"



$x\neq\dfrac{\pi}{2}n\quad n\in I$

Written #4

First bullet



Median line ("d" value)

$$d = \frac{max + min}{2}$$

Dist. from median line to max or min. can also use: $a = \frac{max - min}{2}$

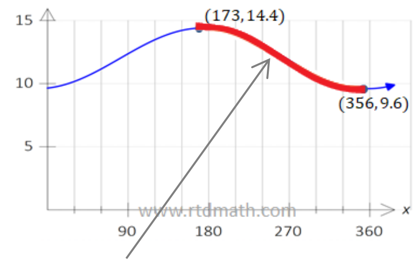
$$d = \frac{14.4 + 9.6}{2}$$

$$\boldsymbol{d = 12}$$

$$a = \frac{14.4 - 9.6}{2}$$

$$\boldsymbol{a = 2.4}$$

For $\boldsymbol{b}$, determine the **period**:



This shows half of the ***period*** *(dist from max to min)*

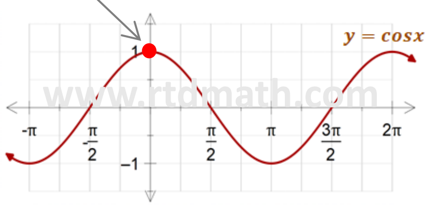
Half of Period = 183 days *(356 − 173)*

Period = 366 days *Actually, this was given!*

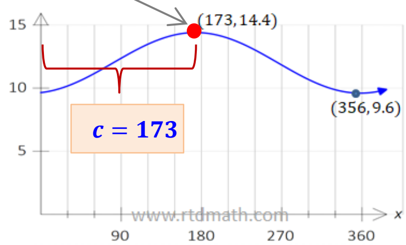
$$b = \frac{2\pi}{366} \Rightarrow \boldsymbol{b = \frac{\pi}{183}}$$

Finally for $\boldsymbol{c_{cos}}$, *determine the horiz. dist of the max from the y-axis*

Basic ***cos*** *curve "starts" at the MAX*



Here the max has ***shifted****, 173 to the right*



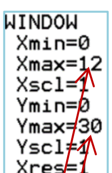
$$\boldsymbol{c = 173}$$

$$\boldsymbol{H = 2.4\cos\left[\frac{\pi}{183}(x - 173)\right] + 12}$$

2nd bullet

Graph $y_1 = 5.1\,sin(0.524(x - 2.75)) + 23.9$

$y_2 = 26$



For x-max, graph over 1 period

$$per = \frac{2\pi}{0.524}$$

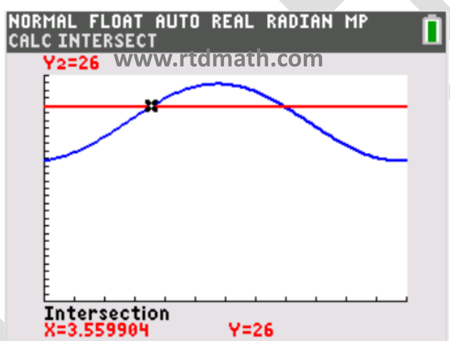
$$\approx \boldsymbol{12}$$

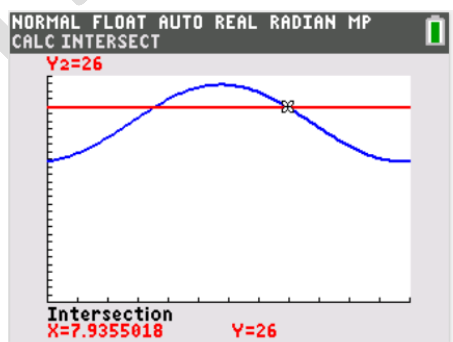
For y-max, use $\boldsymbol{MAX = a + d}$

$$= 5.1 + 23.9$$

$$= \boldsymbol{29}$$

And find the ***INTERSECTS***





So, total # months above 26°C can be found by subtracting….

$$= 7.94 - 3.56$$

4.4 months

Third bullet

$\boldsymbol{a}$ would be **higher**, as the range of Calgary temperatures (between min and max) would be greater

$\boldsymbol{d}$ would be **lower**, as the median temperature for Calgary (represented by d) would be lower

Also…. (not needed in your answer)

$\boldsymbol{b}$ would be **unchanged**, as the period for each city would be the same (12 months). Similarly, $\boldsymbol{c}$ would be essentially unchanged, as the number of months after which the min / max temperature occurs would be approximately the same as both cities are in the northern hemisphere.