Task 1: Give it a go

SIT190 - Week 6 - Quiz -Short

Click on a question number to see how your answers were marked and, where available, full solutions.

Question Number	Score	
Question 1	2 / 2	Review
Question 2	2 / 2	Review
Question 3	6 / 6	Review
Question 4	3 / 3	Review
Total	**13 / 13 (100%)**	

Performance Summary

Exam Name:	SIT190 - Week 6 - Quiz -Short
Session ID:	110295750133
Student's Name:	COWLISHAW, Ethan Del (edcowlishaw)
Exam Start:	Mon Apr 08 2024 17:30:48
Exam Stop:	Mon Apr 08 2024 18:29:33
Time Spent:	0:58:44

SIT190 - Week 6 - Quiz -Short

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Question 1	2 / 2	Review
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Performance Summary

Exam Name:	SIT190 - Week 6 - Quiz -Short
Session ID:	16770603947
Student's Name:	COWLISHAW, Ethan Del (edcowlishaw)
Exam Start:	Tue Apr 09 2024 18:47:47
Exam Stop:	Wed Apr 10 2024 14:13:36
Time Spent:	0:14:26

2) Review quiz results

a) Identify a question

Though I get the right answer eventually, I need to better understand how to convert radians to degrees and vice versa.
I am also struggling to understand the purpose of the $\sin / \cos$ ratio. It's purpose hasn't become clear to me yet.

b/c) Implement a strategy to address this and your strategy.

I plan to study more intently on both of these and asking the teacher for help. I understand there is something with Special/standard triangles in understanding the ratios so I will focus on asking that. I will attempt to mockup an easy-to-refer-to resource for radian to degree conversion and vice versa.

4) Reflection on improvement

I did improve drastically in speed once again, this time by a factor of $3.9\times$. I now have a phrase to remember degree-to-radian: "$^\circ \times \pi$ over 180" said like "degree pi over 180" which from that I can remember the reverse too.
I am starting to gain an understanding of sin and cos through the trigonometric identities and unit circle. It still eludes me intuitively but I am understanding it better each day mathematically through study. The unit circle is also becoming an intuitive tool for finding angles and mirror angles.

Task 2: Trigonometry

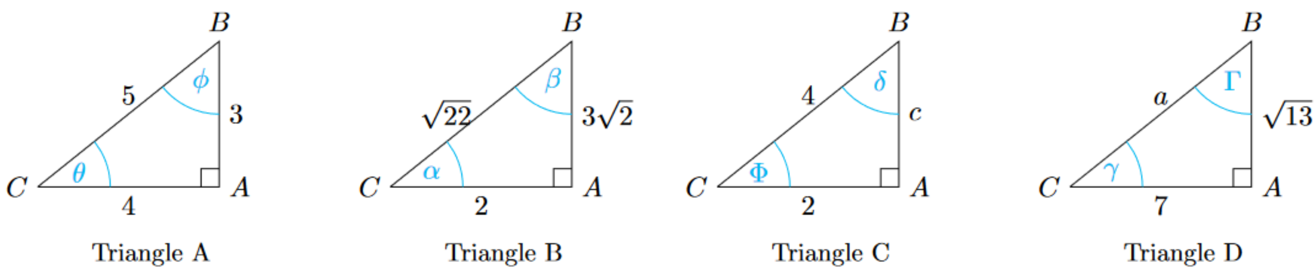
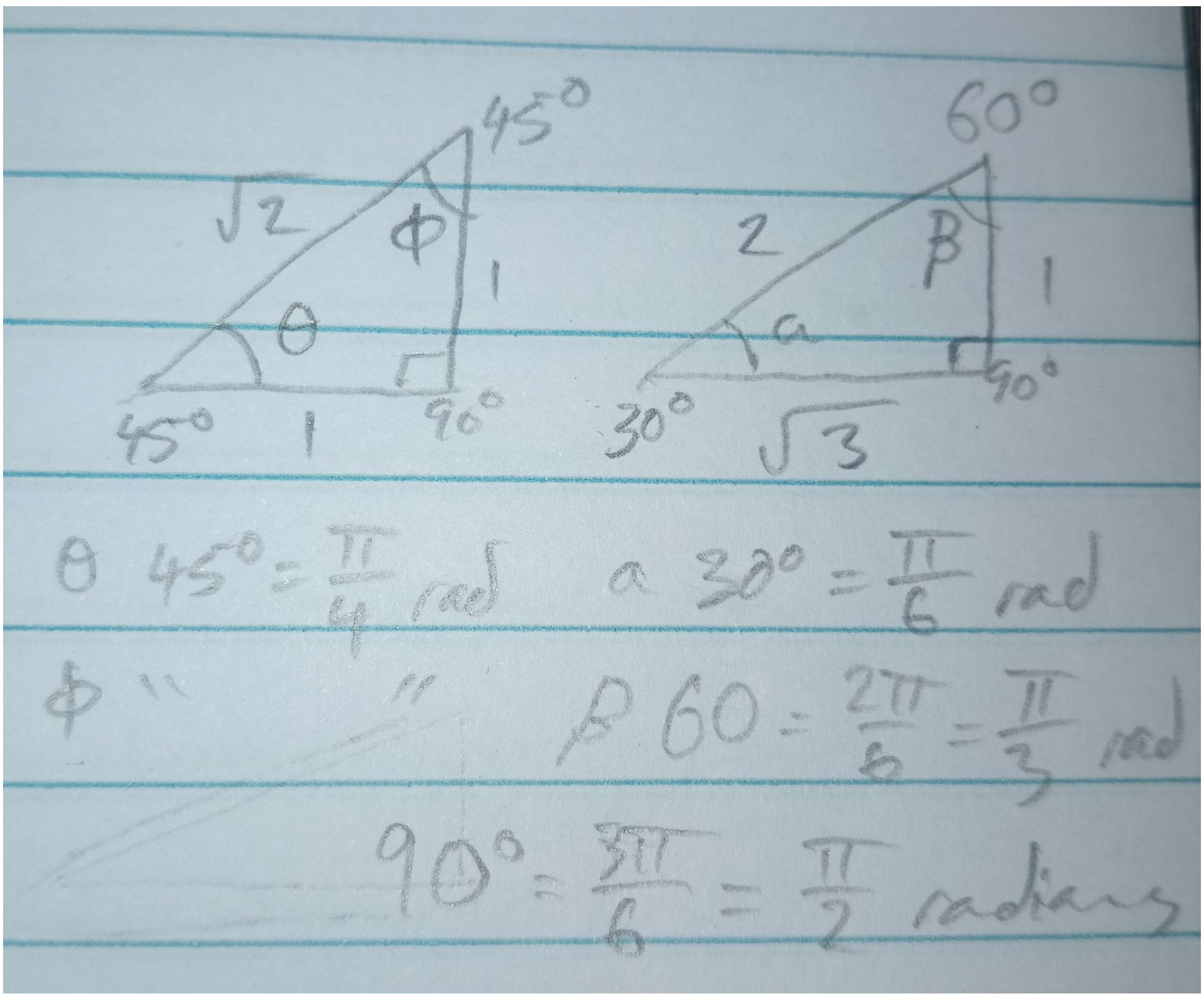


FIGURE 1. Triangle

1) Draw the two special triangles



a) Explain how special triangles can be used to solve triangle A's angles

The two main special triangles don't align with Triangle A and therefore cannot be used to solve these triangles' angles.

$\tan(\theta) = \frac{3}{4}$

-> $\theta = \arctan(\frac{3}{4})$
$\theta = 0.6435$ radians $= 36.87^{\circ}$

$\phi = 180 - 90 - 36.87^{\circ} = 53.13^{\circ}$
$\phi = \pi - \frac{\pi}{2} - 0.6435 = 0.9272952180$

b) Explain how special triangles can be used to solve triangle B's angles

The two main special triangles don't align with Triangle B.
$\tan(\alpha) = \frac{3\sqrt{2}}{2}$
-> $\alpha = \arctan(\frac{3\sqrt{2}}{2})$
$\alpha = 1.1303$ radians

$\beta = \pi - \frac{\pi}{2} - 1.1303 = 0.4405$ radians

c) Explain using a special triangle to find $\cos(\frac{\pi}{6})$, giving the answer too

The special triangle with sides ratio $1 : \sqrt{3} : 2$
We can decide the smallest angle, and apply the formula $\cos(\theta) = \frac{\text{adjacent}}{\text{hypotenuse}}$
-> $\frac{\sqrt{3}}{2} = 0.8660$
-> $\cos(\frac{\pi}{6}) = 0.8660$

If the bigger angle is chosen, we can apply $\sin(\theta) = \frac{\text{opposite}}{\text{hypotenuse}}$
-> $\frac{\sqrt{3}}{2} = 0.8660$
and get the same answer.

2) Find the length of side c in Triangle C in figure 1

$c = \sqrt{x^2 - b^2}$
-> $c = \sqrt{4^2 - 2^2}$
-> $c = \sqrt{16 - 4}$
-> $c = \sqrt{12}$

3) Find the angle δ in Triangle C in radians

$\tan(\delta) = \frac{2}{\sqrt{12}}$
-> $\delta = \arctan(\frac{2}{\sqrt{12}})$
= 0.524 radians

4) Find the length of side a in Triangle D in figure 1

$c = \sqrt{a^2 + b^2}$
-> $c = \sqrt{\sqrt{13}^2 + 7^2}$
-> $c = \sqrt{13 + 49}$
$c = \sqrt{62} = 7.874$

5) Find the angle γ in Triangle D in radians

$\sin(\gamma) = \frac{\sqrt{13}}{7}$
-> $\gamma = \arcsin(\frac{\sqrt{13}}{7})$
$= 0.541$ radians

6) Convert 21° to radians

$21^\circ \times \frac{\pi}{180^\circ} = 0.367$ radians

7) Convert $\frac{\pi}{5}$ radians to degrees

$\frac{\pi}{5} \times \frac{180}{\pi} = 36^\circ$

Task 3: Functions and relations

1) Give the domain and range of the following

a) $y = \frac{2}{x+3}$

Division can be any value except for 0. We can force a zero into the equation by finding what will make x cancel out the 3 and find $\frac{2}{0}$
$x + 3 = 0$
-> $x = -3$
The domain is therefore $x \neq -3$

A division can result in any value, even 0 if the numerator is 0, like $\frac{0}{x+3}$. Since it isn't, the range can be anything except 0
The range is therefore $y \neq 0$

b) $y = \frac{23}{\sqrt{5-x}}$

A real square root cannot be negative and the denominator cannot be $= 0$
$5 - x = 0$
-> $-x = -5$
$x = 5$
x therefore cannot $= 5$ as $\sqrt{5-5} = \sqrt{0} = 0$ which will create a division-by-zero error. It also cannot be any value above 5 like $\sqrt{5-6} = \sqrt{-1}$ as this will create a complex number.
Therefore the domain is $x > 5$

As a real square root will always produce a positive number and as the division will prevent values of 0, the range is
$y > 0$

2) Show that $x^2 + y^2 = 49$ is not a function

A requirement of functions is that every x value has only one y value. This equation is not a function, it is a relation - $x^2 + y^2 = 7^2$ that will create a circle.

$x^2 + y^2 = 49$
-> $x^2 + 0^2 = 49$
-> $x^2 = 49$
$x = \pm 7$

Take the value of $x = 0$ for example:
$x^2 + y^2 = 49$
-> $0^2 + y^2 = 49$
-> $y = \pm\sqrt{49}$
$y = \pm 7$

The y value is 7 or -7, meaning one value of x is equal to at least two values of y and therefore eliminating it from being a function.