Trigonometry

1. **Given the following trigonometric ratios, draw a triangle, find the missing side and use this to solve for the two missing trigonometric ratios ($\sin\theta$, $\cos\theta$ or $\tan\theta$). HINT: there should be two answers for each.** (3 marks each)

a) $\sin\theta = \frac{4}{5}$

b) $\tan\theta = -\frac{\sqrt{3}}{\sqrt{13}}$

Trigonometry

Answers

Trigonometry

$3x^2 + 3 = 10x$

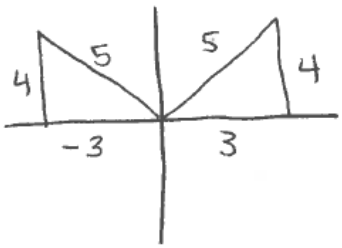
$3x^2 - 10x + 3 = 0$

$(3x-1)(x-3) = 0$

$x = \frac{1}{3}$ and 3

1. Given the following trigonometric ratios, draw a triangle, find the missing side and use this to solve for the two missing trigonometric ratios ($\sin\theta$, $\cos\theta$ or $\tan\theta$). HINT: there should be two answers for each. (3 marks each)

a) $\sin\theta = \frac{4}{5}$



$\cos\theta = \pm\frac{3}{5}$

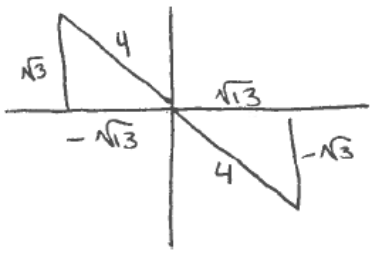
$\tan\theta = \pm\frac{4}{3}$

Answer:

$\cos\theta = \pm\frac{3}{5}$

$\tan\theta = \mp\frac{4}{3}$

b) $\tan\theta = -\frac{\sqrt{3}}{\sqrt{13}}$



Answer:

$\cos\theta = \pm\frac{\sqrt{13}}{4}$

$\sin\theta = \pm\frac{\sqrt{3}}{4}$

Trigonometry

2. Evaluate exactly (without a calculator)

a) $\sin 270^o =$	**b)** $\cos(-45^o) =$
c) $\tan 240^o =$	**d)** $\dfrac{\sin 135^o}{\cos(-225^o)} =$

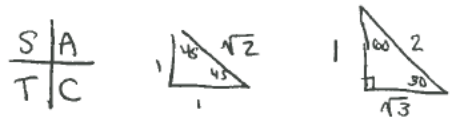
3. Find all θ for $0^o \le \theta \le 360^o$ that satisfy the given equation. There could be more than one answer! Use the unit circle and/or special triangles! (1.5 marks each)

a) $\cos\theta = 0$	**b)** $\tan\theta = -1$
c) $\sin\theta = \dfrac{\sqrt{3}}{2}$	**d)** $\cos\theta = 0.5$

Trigonometry

Answers

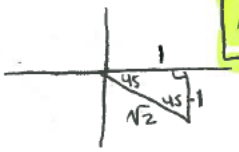
2. Evaluate exactly (without a calculator) (1 mark each)



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

a) $\sin 270^\circ =$ **−1**

b) $\cos(-45^\circ) =$ $\frac{1}{\sqrt{2}}$

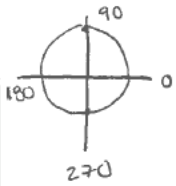


c) $\tan 240^\circ =$ $\sqrt{3}$

d) $\frac{\sin 135^\circ}{\cos(-225^\circ)} =$ **-1**

3. Find all θ for $0^\circ \le \theta \le 360^\circ$ that satisfy the given equation. There could be more than one answer! Use the unit circle and/or special triangles! (1.5 marks each)

a) $\cos\theta = 0$



$\theta = 90^\circ, 270^\circ$

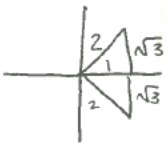
b) $\tan\theta = -1$

$\theta = 135^\circ, 315^\circ$

c) $\sin\theta = \frac{\sqrt{3}}{2}$

$\theta = 60^\circ, 120^\circ$

d) $\cos\theta = 0.5$



$\theta = 60^\circ, 300^\circ$

4. Use the sine law to solve the following triangles. In the case where there is no triangle, write "no solution." In the case where there is two triangles, solve for both. (2 marks each)

a) $\angle A = 65^o, a = 9, b = 11$

b) $\angle A = 105^o, \angle B = 35^o, c = 12cm$

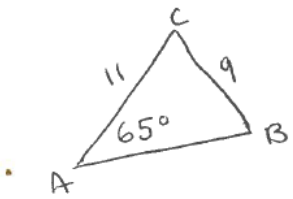
c) $\angle A = 76^o, a = 25, b = 20$

Trigonometry

Answers

4. Use the sine law to solve the following triangles. In the case where there is no triangle, write "no solution." In the case where there is two triangles, solve for both. (2 marks each)

a) $\angle A = 65^\circ, a = 9, b = 11$



ASS

$\frac{\sin 65}{9} = \frac{\sin B}{11}$

$\sin B = 1.11$

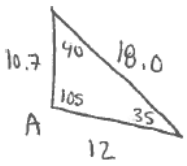
NO TRIANGLE

Answer:
NO TRIANGLE

b) $\angle A = 105^\circ, \angle B = 35^\circ, c = 12cm$

$\angle C = 40^\circ$

AAS



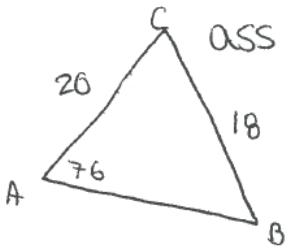
$\frac{\sin 40}{12} = \frac{\sin 35}{b}$

$b = 10.7$

$\frac{\sin 40}{12} = \frac{\sin 105}{a}$

Answer:
$b = 10.7$
$\angle C = 40^\circ$
$a = 18.0$

c) $\angle A = 76^\circ, a = 25, b = 20$ *change maybe?



ASS

$\frac{\sin 76}{25} = \frac{\sin B}{20}$

$\angle B = 50.1^\circ$

OR ~~129.9~~ NO

$\angle B = 50.1^\circ$

$\frac{\sin 53.9}{c} = \frac{\sin 76}{25} \rightarrow c = 20.8$

Answer:
$\angle B = 50.1^\circ$
$\angle C = 53.9^\circ$
$c = 20.8$

5. **Determine whether or not you need to use the Sine Law or the Cosine Law to solve the triangle. Then, solve the triangle (watch for no solution and 2 solutions!)** (3marks each)

a) a=8, b=10, c= 15

b) $\angle A = 25^o, a = 9, b = 20$

c) $a = 14, b = 12, \angle C = 35^o$

Trigonometry

Answers

5. Determine whether or not you need to use the Sine Law or the Cosine Law to solve the triangle. Then, solve the triangle (watch for no solution and 2 solutions!) (3marks each)

a) a=8, b=10, c=15

SSS

$\rightarrow 8^2 = 10^2 + 15^2 - 2(10)(15)\cos A$

$8^2 - 10^2 - 15^2 = -300\cos A$

$-261 = -300\cos A$

$0.87 = \cos A$

$\angle A = 29.5°$

$\frac{\sin 29.5}{8} = \frac{\sin B}{10} \rightarrow \angle B = 38.0°$

Answer:
$\angle A = 29.5°$
$\angle B = 38.0°$
$\angle C = 112.5°$

b) $\angle A = 25°, a = 9, b = 20$

ASS

$\frac{\sin 25}{9} = \frac{\sin B}{20} \Rightarrow \angle B = 69.9°$ OR $110.1°$ > ambiguous case!

Ambiguous Case

$\triangle 1$ if $\angle B = 69.9°$, $\angle C = 85.1°$, $c = 21.2$

$\triangle 2$ if $\angle B = 110.1°$, $\angle C = 44.9°$, $c = 15.0$

$\triangle 1$ $\frac{\sin 85.1}{c} = \frac{\sin 25}{9}$

OR

$\triangle 2$ $\frac{\sin 44.9°}{c} = \frac{\sin 25}{9}$

Answer:
$\triangle 1$:
$\angle B = 69.9°$
$\angle C = 85.1°$
$c = 21.2$
$\triangle 2$
$\angle B = 110.1°$
$\angle C = 44.9°$
$c = 15.0$

c) $a = 14, b = 12, \angle C = 35°$

SSA

$c^2 = 14^2 + 12^2 - 2(12)(14)\cos 35$

$c = 8.05$

$\angle B \rightarrow \frac{\sin B}{12} = \frac{\sin 35}{8.0}$

$\angle B = 59.4°$

$\angle A = 85.6°$

Answer:
$\angle A = 85.6°$
$\angle B = 59.4°$
$c = 8.05$