KEY

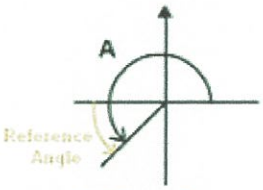
L48 – 2.1 Angles in Standard Position

Key Ideas

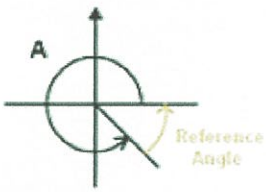
The reference angle is the positive acute angle that can represent an angle of any measure. The reference angle is always the smallest angle that you can make from the terminal side of an angle (ie wher eteh angle ends) with the x-axis.

1st Quadrant

2nd Quadrant



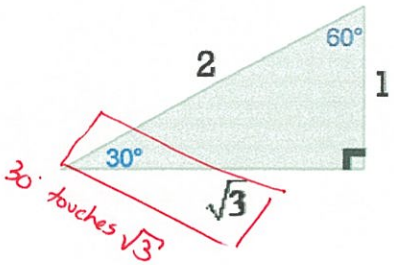
3rd Quadrant

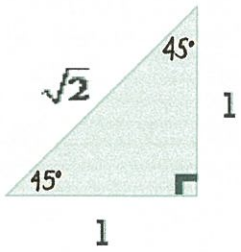


4th Quadrant

There are two special triangles in trigonometry. One is the 30^0-60^0-90^0 triangle, and the other is an isosoles 45^0-45^0-90^0 triangle. They are special because, with simple geometry, we can know the ratios of their sides.

Evaluating Functions of a 30°, 45°, or 60° Angle





$\sin 30° = \frac{1}{2}$ $\quad \sin 60° = \frac{\sqrt{3}}{2}$ $\quad \sin 45° = \frac{\sqrt{2}}{2}$

$\cos 30° = \frac{\sqrt{3}}{2}$ $\quad \cos 60° = \frac{1}{2}$ $\quad \sin 45° = \frac{\sqrt{2}}{2}$

$\tan 30° = \frac{\sqrt{3}}{3}$ $\quad \tan 60° = \sqrt{3}$ $\quad \sin 45° = 1$

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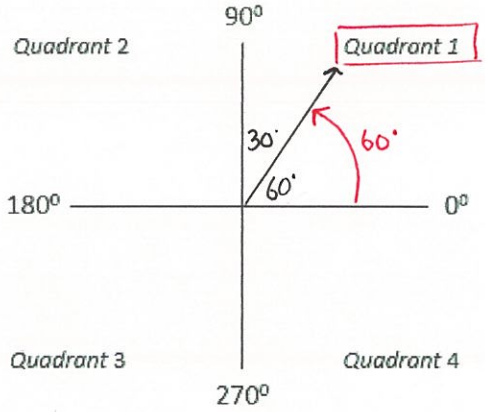
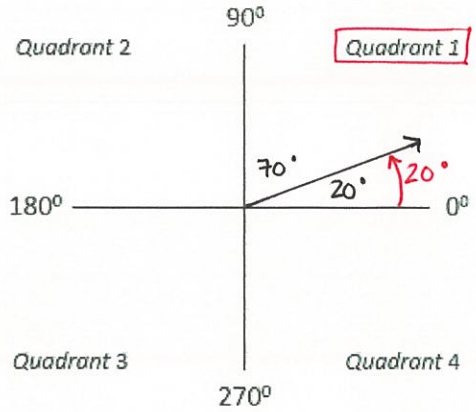
Part 1 – Polar Coordinates and Quadrants

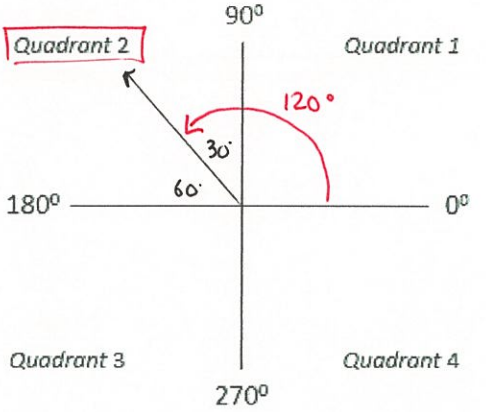
Q1: Draw an angle of 60^0. Which quadrant?



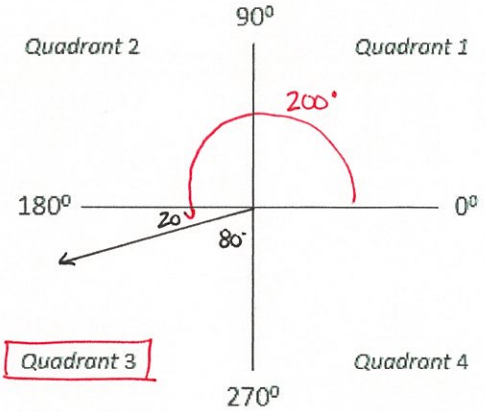
Q2: Draw an angle of 20^0. Which quadrant?



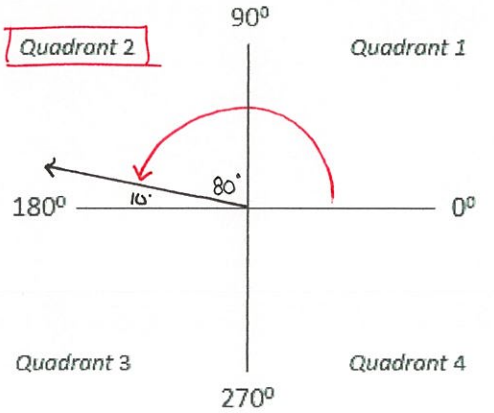
Q3: Draw an angle of 120^0. Which quadrant?



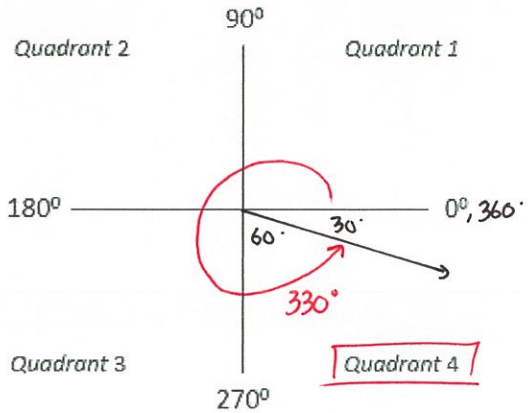
Q4: Draw an angle of 200^0. Which quadrant?



Q5: Draw an angle of 170^0. Which quadrant?



Q6: Draw an angle of 330^0. Which quadrant?



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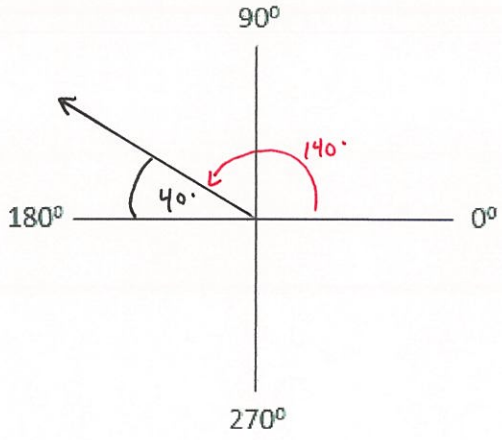
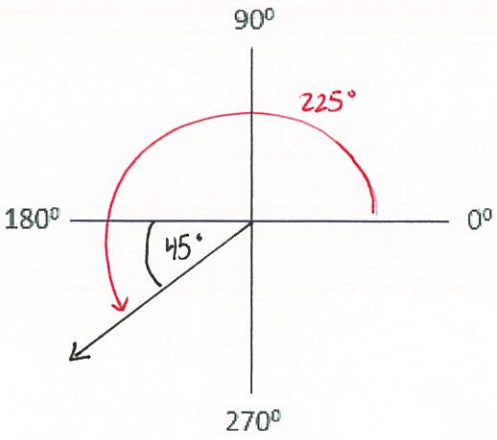
Part 2 – Reference Angles

Q7: Draw the angle 140^0 in Standard Position, determine the Reference Angle, and state which Quadrant it is found in.



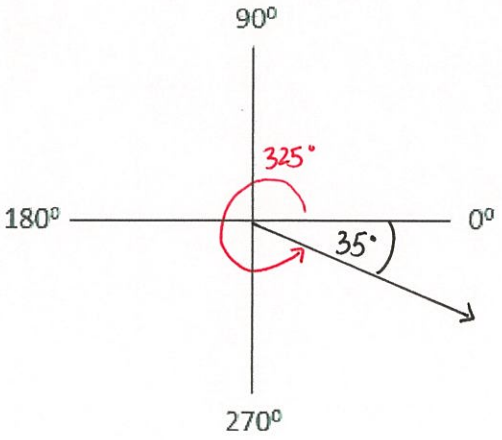
Reference Angle: 40°
Quadrant: 2

Q8: Draw the angle225^0 in Standard Position, determine the Reference Angle, and state which Quadrant it is found in.



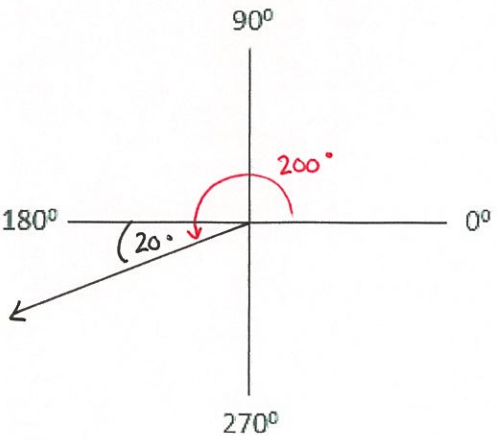
Reference Angle: 45°
Quadrant: 3

Q9: Draw the angle 325^0 in Standard Position, determine the Reference Angle, and state which Quadrant it is found in.



Reference Angle: 35°
Quadrant: 4

Q10: Draw the angle 200^0 in Standard Position, determine the Reference Angle, and state which Quadrant it is found in.



Reference Angle: 20°
Quadrant: 3

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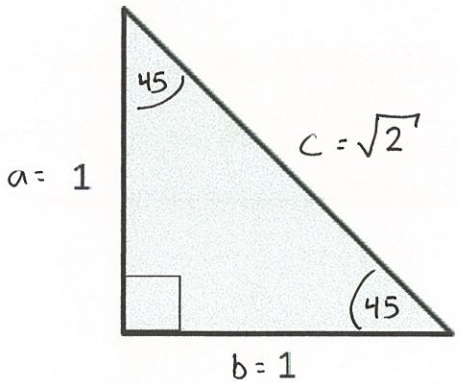
Part 3 – Special Triangles

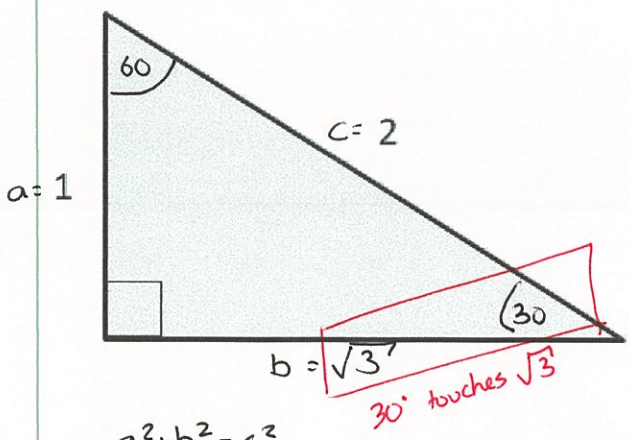
Q11: Use *Pythagoras Theorem* to determine the missing side for each triangle. Next, label the missing angles on each triangle.

45^0-45^0-90^0 Triangle



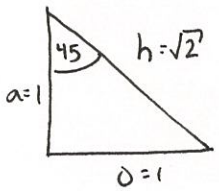
$a^2+b^2=c^2$
$1^2+1^2=c^2$
$1+1=c^2$
$2=c^2$
$\sqrt{2}=c$

30^0-60^0-90^0 Triangle



$a^2+b^2=c^2$
$1^2+b^2=2^2$
$1+b^2=4$
$b^2=3$
$b=\sqrt{3}$

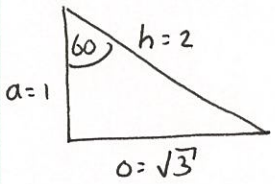
Q12: For each triangle, determine the exact values of the Trigonometric Ratios.



$\sin 45^\circ = \frac{1}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{\sqrt{2}}{2}$

$\cos 45^\circ = \frac{1}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{\sqrt{2}}{2}$

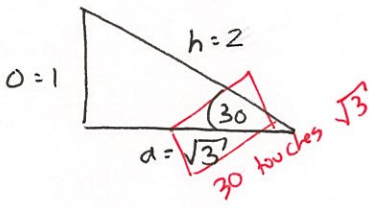
$\tan 45^\circ = \frac{1}{1} = 1$



$\sin 60 = \frac{\sqrt{3}}{2}$

$\cos 60 = \frac{1}{2}$

$\tan 60 = \frac{\sqrt{3}}{1} = \sqrt{3}$



$\sin 30 = \frac{1}{2}$

$\cos 30 = \frac{\sqrt{3}}{2}$

$\tan 30 = \frac{1}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{\sqrt{3}}{3}$

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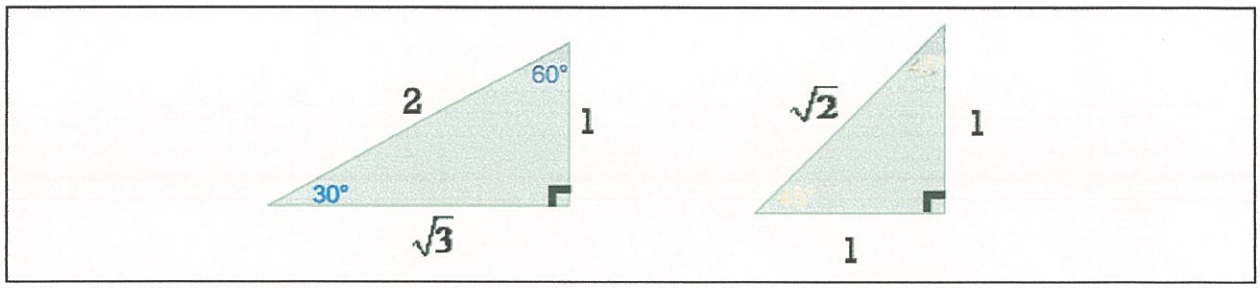
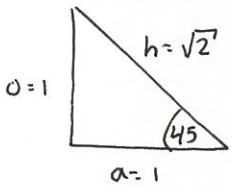
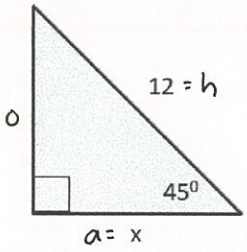
Use the following information to answer Q13:



Q13: Given the triangles below, determine the exact value of x.

NOT DRAWN TO SCALE





$\cos\theta = \frac{a}{h}$

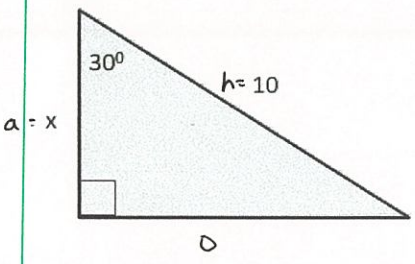
$\cos 45 = \frac{x}{12}$

$\frac{1}{\sqrt{2}} = \frac{x}{12}$

$\frac{12}{\sqrt{2}} = x$

$x = \frac{12}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{12\sqrt{2}}{2}$

$\boxed{x = 6\sqrt{2}}$



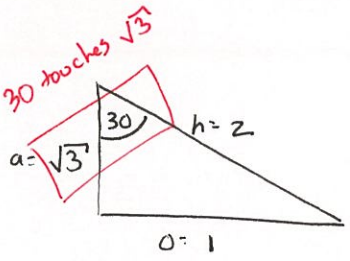
$\cos 30 = \frac{a}{h}$

$\cos 30 = \frac{x}{10}$

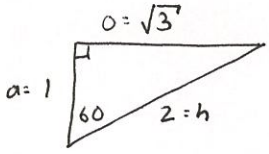
$\frac{\sqrt{3}}{2} = \frac{x}{10}$

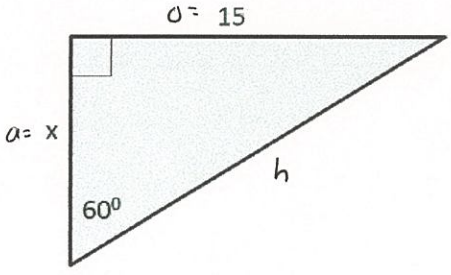
$\frac{10\sqrt{3}}{2} = x$

$\boxed{x = 5\sqrt{3}}$



Q14: Given the triangles below, determine the exact value of x.





$\tan 60 = \frac{o}{a}$

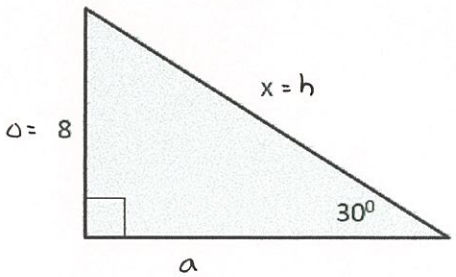
$\tan 60 = \frac{15}{x}$

$\frac{\sqrt{3}}{1} = \frac{15}{x}$

$x\sqrt{3} = 15$

$x = \frac{15}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{15\sqrt{3}}{3}$

$\boxed{x = 5\sqrt{3}}$



$\sin 30 = \frac{o}{h}$

$\sin 30 = \frac{8}{x}$

$\frac{1}{2} = \frac{8}{x}$

$\boxed{x = 16}$