

55 - Worksheet - Absolute Values, Reciprocal Functions, and Trigonometry

Part 1 - 7.1 Absolute Value

Q1: Evaluate the following expressions:

$|9 - 2(6)|$

$|9 - 12|$

$|1 - 3|$

$\boxed{3}$

$4 - |5 - 11|$

$4 - |1 - 6|$

$4 - 6$

$\boxed{-2}$

$3 + 2|4 - 3^2|$

$3 + 2|4 - 9|$

$3 + 2| -5 |$

$3 + 2(5)$

$3 + 10$

$\boxed{13}$

Q2: The expression $6 - |7 - 3^2|$ evaluates to ____.

(Record your answer in the Numerical Response boxes below)

$\boxed{4}$

$6 - |7 - 9|$

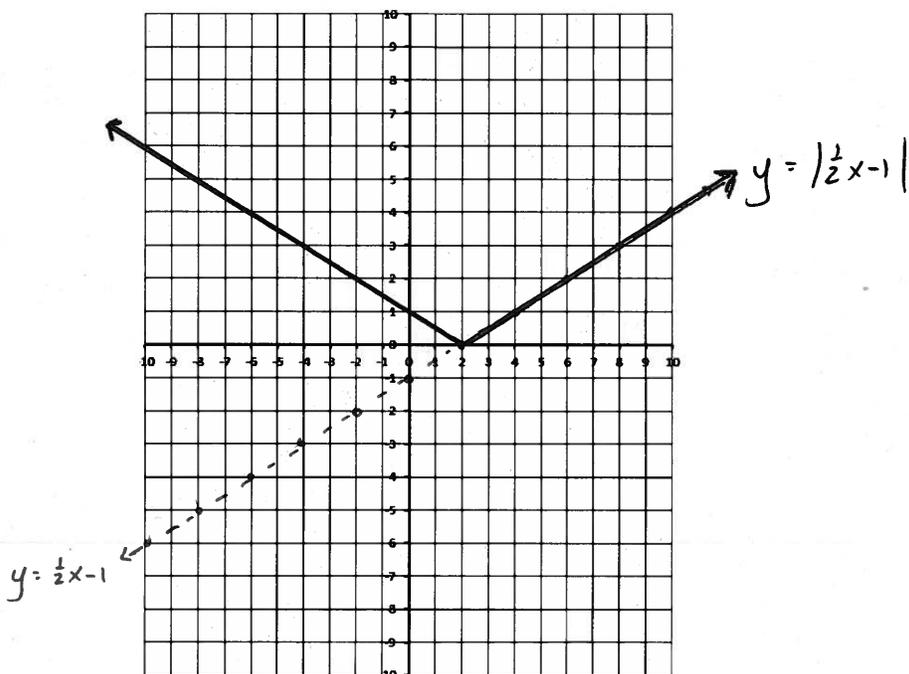
$6 - | -2 |$

$6 - 2$

$\boxed{4}$

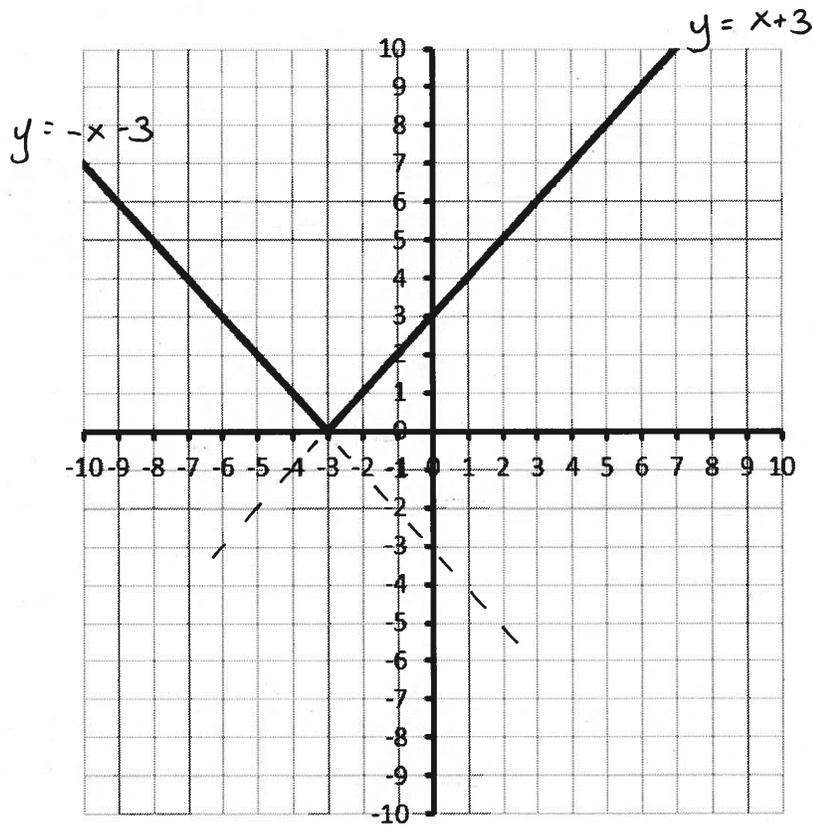
Part 2 - 7.2 Absolute Value Functions

Q3: Graph $y = |\frac{1}{2}x - 1|$



Use the following information to answer Q4:

A absolute value function is graphed below:



Q4: A piecewise function can be written for this function as

$$f(x) = \begin{cases} 1x + 3 & x < -3 \\ ax + b, & x < -3 \\ -cx - d, & x \geq -3 \\ -1x - 3 & x \geq -3 \end{cases}$$

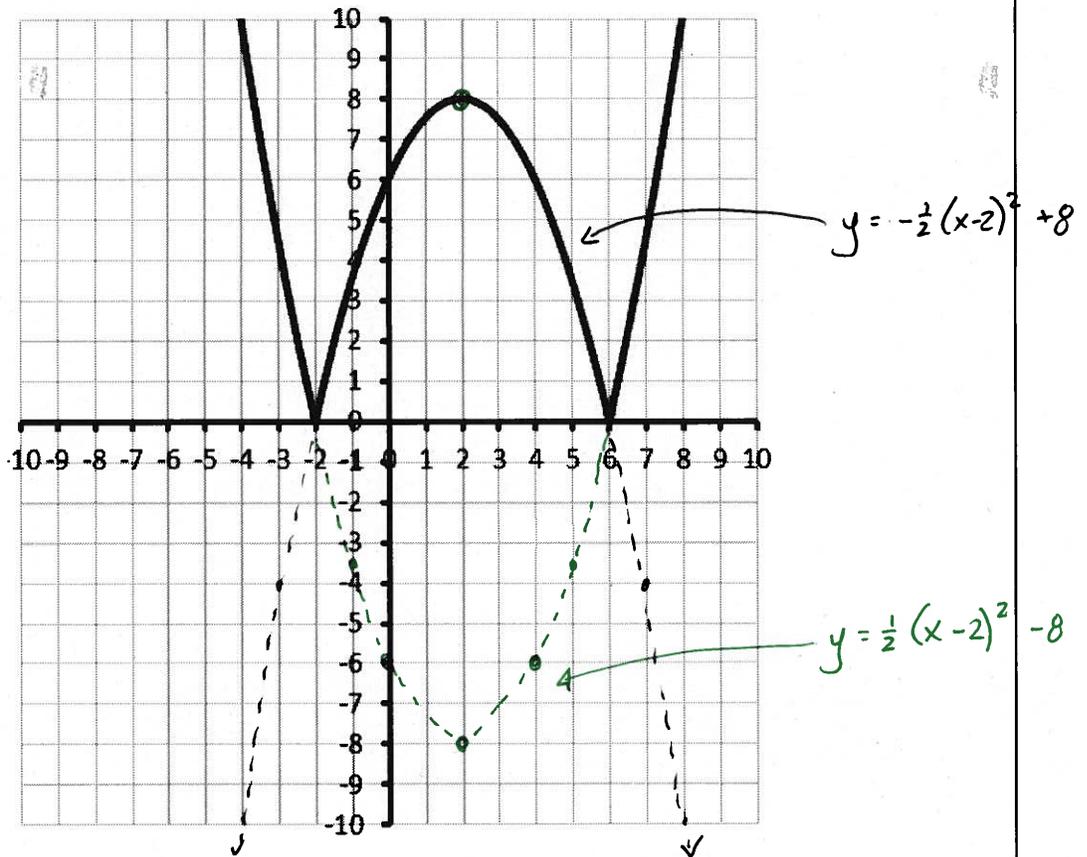
Where a , b , c , and d are 1, 3, 1, and 3.

(Record your **four digit** answer in the Numerical Response boxes below)

1	3	1	3
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Use the following information to answer Q5:

An absolute value function is graphed below:



Q5: Write a piecewise function to describe the function.

$$y = -\frac{1}{2}(x-2)^2 + 8 \quad \text{for } x \leq -2, x \geq 6$$

$$y = \frac{1}{2}(x-2)^2 - 8 \quad \text{for } -2 < x < 6$$

Part 3 - 7.3 Absolute Value Equations

Q6: Solve $|2x - 8| = -2x^2 + 6x + 2$ algebraically. Verify your answers.

$$+(2x-8) = -2x^2 + 6x + 2$$

$$2x-8 = -2x^2 + 6x + 2$$

$$+2x^2 - 6x - 2 \quad +2x^2 - 6x - 2$$

$$2x^2 - 4x - 10 = 0$$

$$\div 2 \quad \div 2 \quad \div 2 \quad \div 2$$

$$x^2 - 2x - 5 = 0$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{2 \pm \sqrt{4 - 4(1)(-5)}}{2(1)}$$

$$x = \frac{2 \pm \sqrt{24}}{2} = \frac{2 \pm 2\sqrt{6}}{2} = 1 \pm \sqrt{6}$$

$$x_1 = 1 + \sqrt{6} \\ \approx 3.45$$

$$x_2 = 1 - \sqrt{6} \\ \approx -1.45$$

Doesn't verify.

Doesn't verify.

$$-(2x-8) = -2x^2 + 6x + 2$$

$$-2x+8 = -2x^2 + 6x + 2$$

$$+2x^2 - 6x - 2 \quad +2x^2 - 6x - 2$$

$$2x^2 - 8x + 6 = 0$$

$$\div 2 \quad \div 2 \quad \div 2 \quad \div 2$$

$$x^2 - 4x + 3 = 0$$

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

$$x_3 = 1$$

Good!

$$x_4 = 3$$

Good!

$$\text{So } x = 1 \text{ or } 3$$

Q7: Solve $|x^2 - 4| = x + 2$ algebraically. Verify your answers.

$$+(x^2-4) = x+2$$

$$x^2-4 = x+2$$

$$-x-2 \quad -x-2$$

$$x^2 - x - 6 = 0$$

$$(x-3)(x+2) = 0$$

$$x = 3$$

$$x = -2$$

$$-(x^2-4) = x+2$$

$$-x^2+4 = x+2$$

$$+x^2-4 \quad +x^2-4$$

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

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

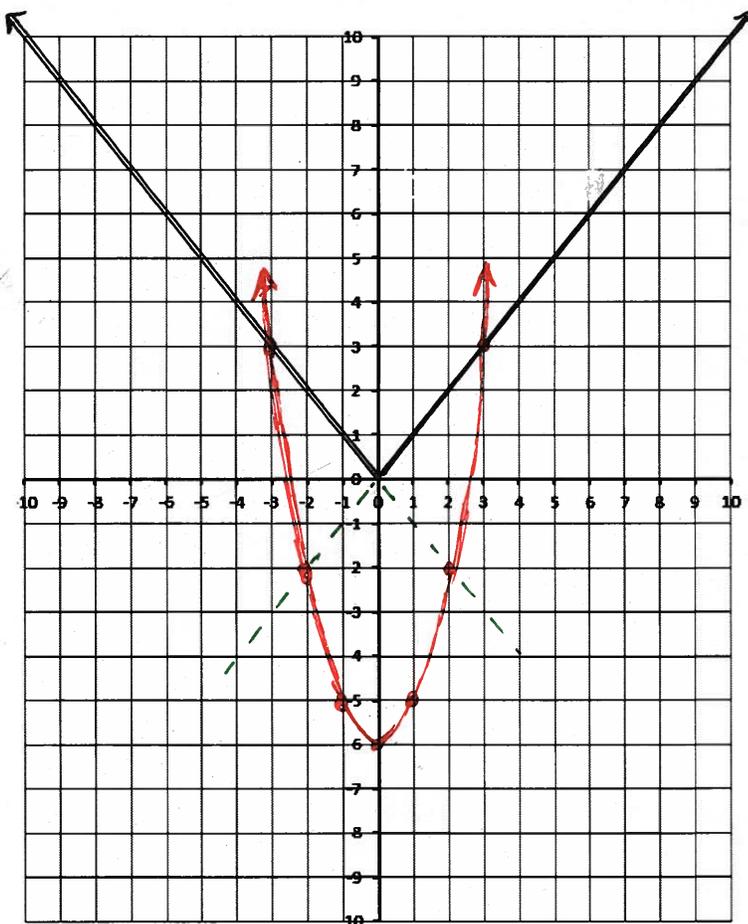
$$x = -2$$

$$x = 1$$

All work.

$$\text{So } x = -2, 1, 3$$

Q8: Solve $|x| = x^2 - 6$ algebraically. Verify your answers. Confirm by graphing.



$$+(x) = x^2 - 6$$

$$x = x^2 - 6$$

$$-x \quad -x$$

$$0 = x^2 - x - 6$$

$$0 = (x-3)(x+2)$$



$$\boxed{x=3}$$

$$\boxed{x=-2}$$

Good

Doesn't
verify.

$$-(x) = x^2 - 6$$

$$-x = x^2 - 6$$

$$+x \quad +x$$

$$0 = x^2 + x - 6$$

$$0 = (x+3)(x-2)$$



$$\boxed{x=-3}$$

$$\boxed{x=2}$$

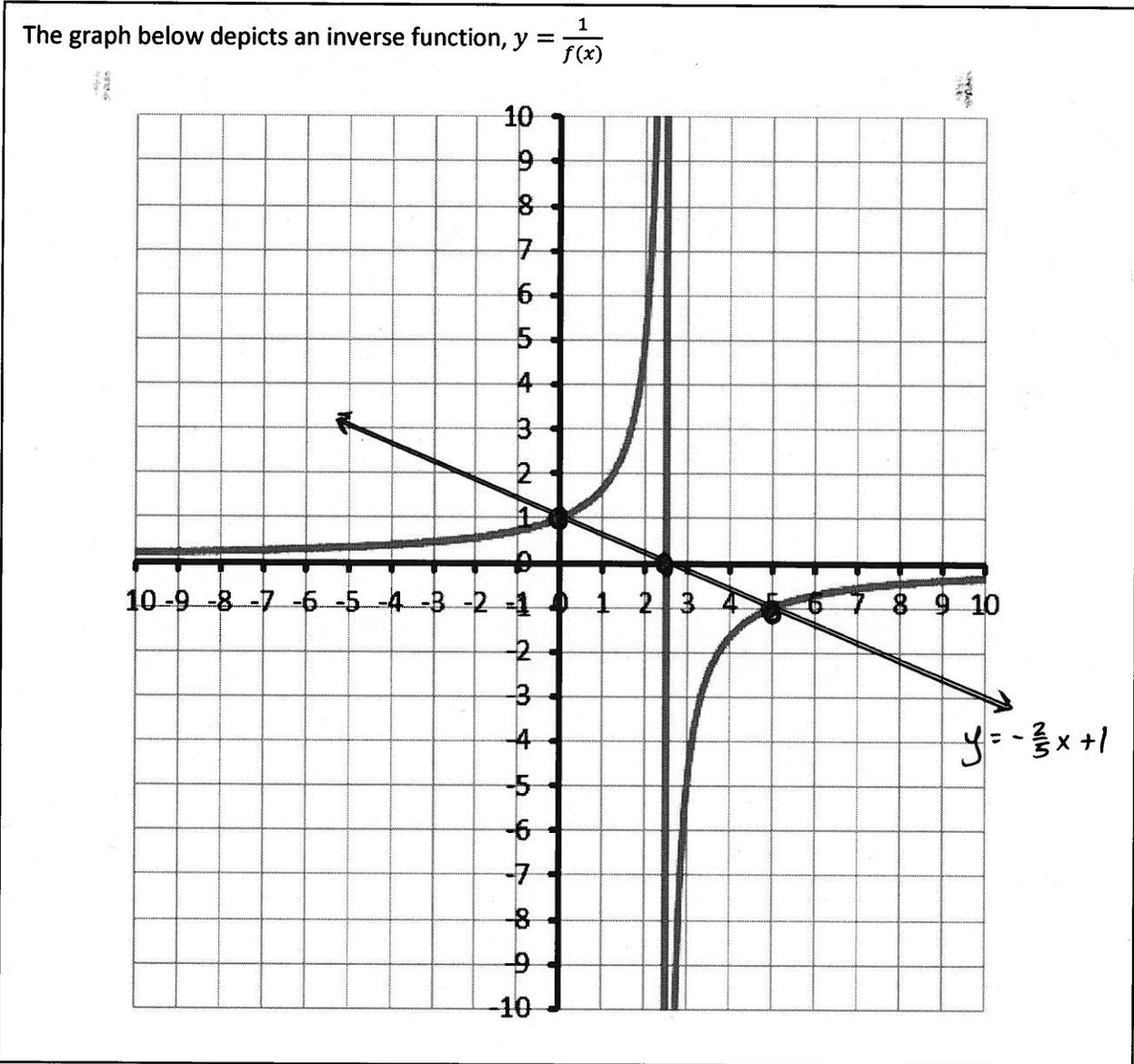
Good.

Doesn't
verify.

$$\text{So } \boxed{x = -3, 3}$$

Part 4 – 7.4 Reciprocal Functions

Use the following information to answer Q9:

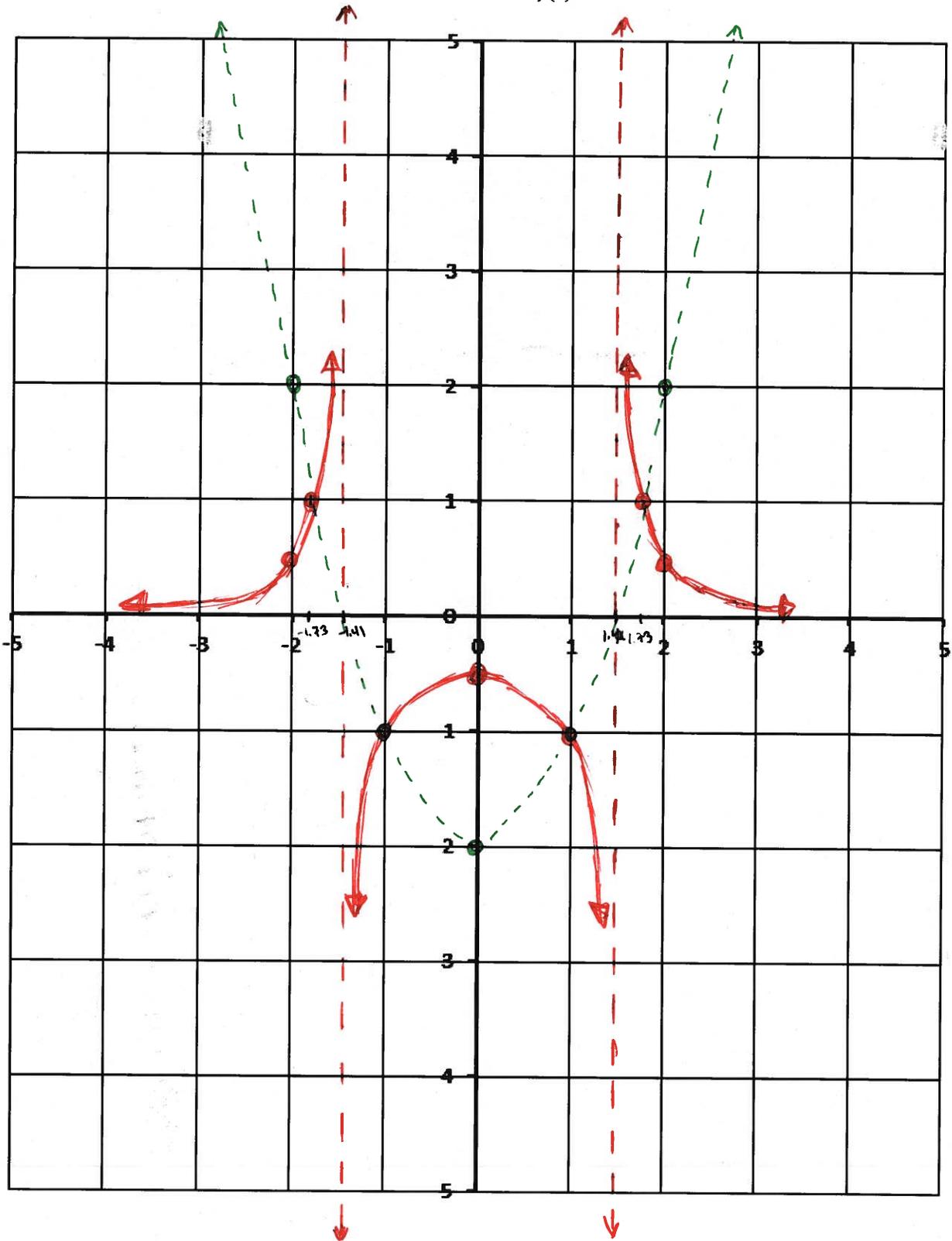


Q9: The original function can be written as $f(x) = -\frac{a}{b}x + c$, where a , b , and c are ____, ____, and ____.

(Record your three digit answer in the Numerical Response boxes below)

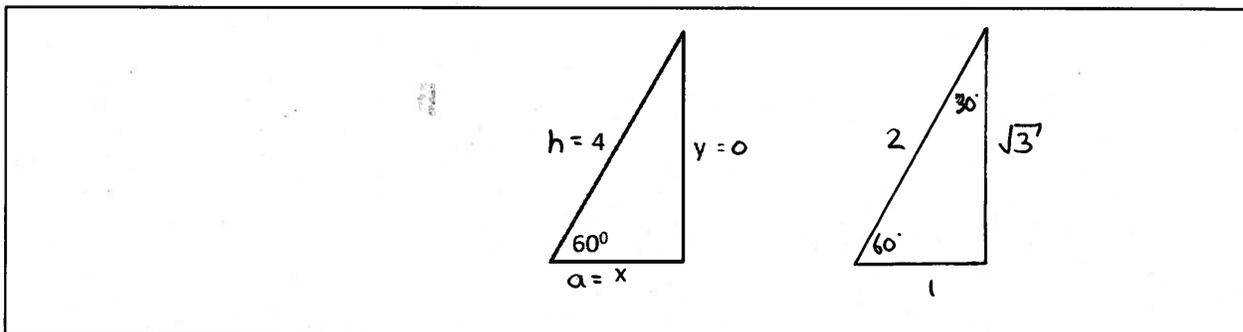
2	5	1	
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Q10: If $f(x) = x^2 - 2$, graph the reciprocal function $y = \frac{1}{f(x)}$



Part 5 – 2.1 Angles in Standard Position

Use the following information to answer Q11-Q12:

Q11: Determine the exact value of x .

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

$$\cos 60^\circ = \frac{x}{4}$$

$$\frac{1}{2} = \frac{x}{4}$$

$$\boxed{x = 2}$$

Q12: Determine the exact value of y .

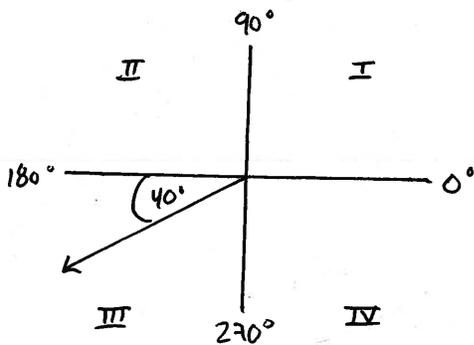
$$\sin \theta = \frac{a}{h}$$

$$\sin \theta = \frac{y}{4}$$

$$\frac{\sqrt{3}}{2} = \frac{y}{4}$$

$$\frac{4\sqrt{3}}{2} = y$$

$$\boxed{y = 2\sqrt{3}}$$

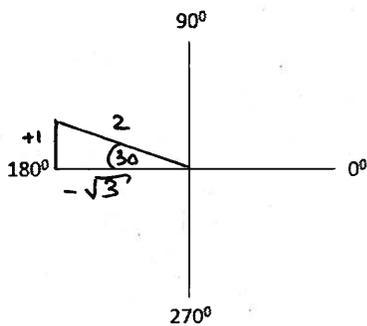
Q13: The angle of 220° has the terminal arm in which quadrant? What is the reference angle?

Quadrant 3.

Reference Angle is 40°

Part 6 – 2.2 Trigonometric Ratios of Any Angle

Q14: Determine the exact values for the $\sin 150^\circ$, $\cos 150^\circ$, and $\tan 150^\circ$ ratios.



$$\sin 150^\circ = \frac{y}{r} = \frac{\sqrt{3}}{2}$$

$$\boxed{\sin 150^\circ = \frac{\sqrt{3}}{2}}$$

$$\cos 150^\circ = \frac{x}{r} = \frac{-1}{2}$$

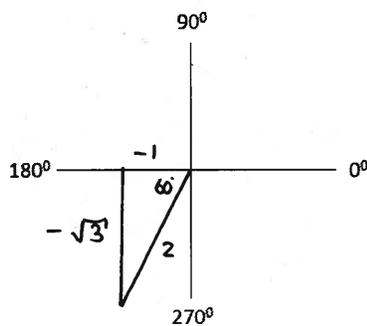
$$\boxed{\cos 150^\circ = -\frac{\sqrt{3}}{2}}$$

$$\tan 150^\circ = \frac{y}{x} = \frac{\sqrt{3}}{-1}$$

$$\tan 150^\circ = -\sqrt{3}$$

$$\boxed{\tan 150^\circ = -\sqrt{3}}$$

Q15: Determine the exact values for the $\sin 240^\circ$, $\cos 240^\circ$, and $\tan 240^\circ$ ratios.



$$\sin 240^\circ = \frac{y}{r} = \frac{-\sqrt{3}}{2}$$

$$\boxed{\sin 240^\circ = -\frac{\sqrt{3}}{2}}$$

$$\cos 240^\circ = \frac{x}{r} = \frac{-1}{2}$$

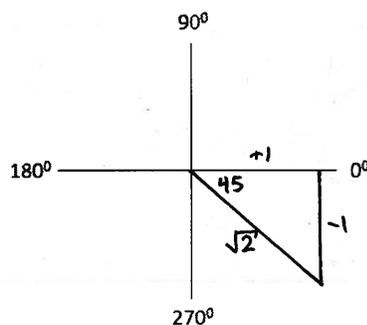
$$\boxed{\cos 240^\circ = -\frac{1}{2}}$$

$$\tan 240^\circ = \frac{y}{x} = \frac{-\sqrt{3}}{-1}$$

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

$$\boxed{\tan 240^\circ = \sqrt{3}}$$

Q16: Determine the exact values for the $\sin 315^\circ$, $\cos 315^\circ$, and $\tan 315^\circ$ ratios.



$$\sin 315^\circ = \frac{y}{r} = \frac{-1}{\sqrt{2}}$$

$$\sin 315^\circ = -\frac{1}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}}$$

$$\boxed{\sin 315^\circ = -\frac{\sqrt{2}}{2}}$$

$$\cos 315^\circ = \frac{x}{r} = \frac{1}{\sqrt{2}}$$

$$\cos 315^\circ = \frac{1}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}}$$

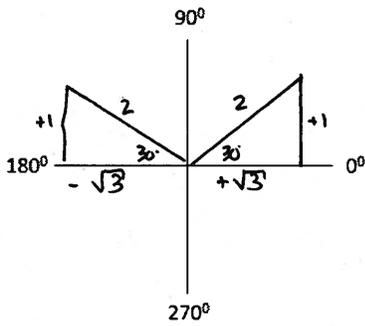
$$\boxed{\cos 315^\circ = \frac{\sqrt{2}}{2}}$$

$$\tan 315^\circ = \frac{y}{x} = \frac{-1}{1}$$

$$\tan 315^\circ = -1$$

$$\boxed{\tan 315^\circ = -1}$$

Q17: Solve $\sin\theta = \frac{1}{2}$ equation, for $0 \leq \theta < 360 \text{ deg}$, using a diagram involving a special right triangle.

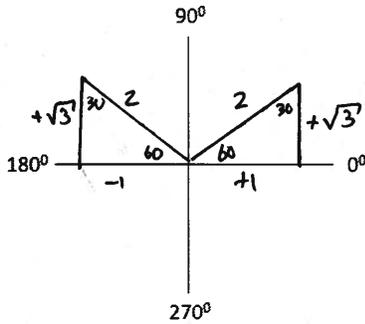


$$\sin\theta = \frac{o}{h}$$

So opp is positive,
+a or -a

$$\theta = 30^\circ \text{ or } 150^\circ$$

Q18: Solve $\sin\theta = \frac{\sqrt{3}}{2}$ equation, for $0 \leq \theta < 360 \text{ deg}$, using a diagram involving a special right triangle.

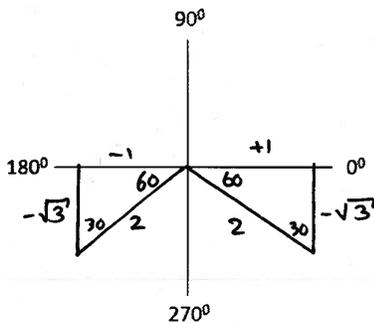


$$\sin\theta = \frac{o}{h}$$

So +o
+a or -a

$$\theta = 60^\circ \text{ or } 120^\circ$$

Q19: Solve $\sin\theta = -\frac{\sqrt{3}}{2}$ equation, for $0 \leq \theta < 360 \text{ deg}$, using a diagram involving a special right triangle.

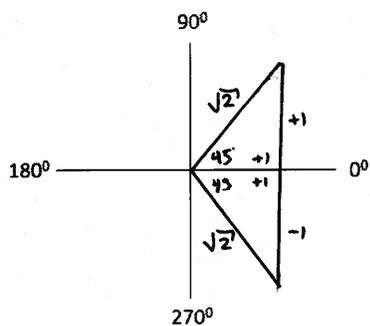


$$\sin\theta = \frac{o}{h}$$

So -o
+a or -a

$$\theta = 240^\circ \text{ or } 300^\circ$$

Q20: Solve $\cos\theta = \frac{\sqrt{2}}{2}$ equation, for $0 \leq \theta < 360 \text{ deg}$, using a diagram involving a special right triangle.



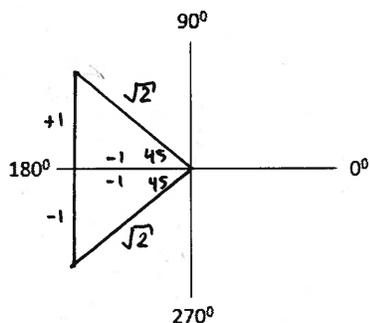
$$\cos\theta = \frac{a}{r}$$

$$\begin{aligned} \text{so } &+a \\ &+0 \text{ or } -0 \end{aligned}$$

Remember $\frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$

$$\theta = 45^\circ \text{ or } 315^\circ$$

Q21: Solve $\cos\theta = -\frac{\sqrt{2}}{2}$ equation, for $0 \leq \theta < 360 \text{ deg}$, using a diagram involving a special right triangle.

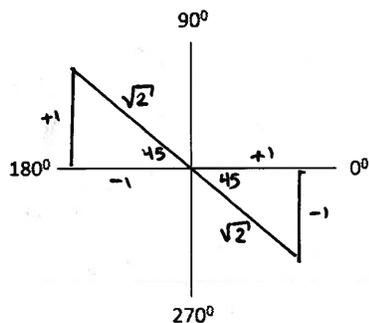


$$\cos\theta = \frac{a}{r}$$

$$\begin{aligned} \text{so } &-a \\ &+0 \text{ or } -0 \end{aligned}$$

$$\theta = 135^\circ \text{ or } 225^\circ$$

Q22: Solve $\tan\theta = -1$ equation, for $0 \leq \theta < 360 \text{ deg}$, using a diagram involving a special right triangle.



$$\tan\theta = \frac{a}{b} \rightarrow \tan\theta = \frac{+1}{-1} \text{ or } \tan\theta = \frac{-1}{+1}$$

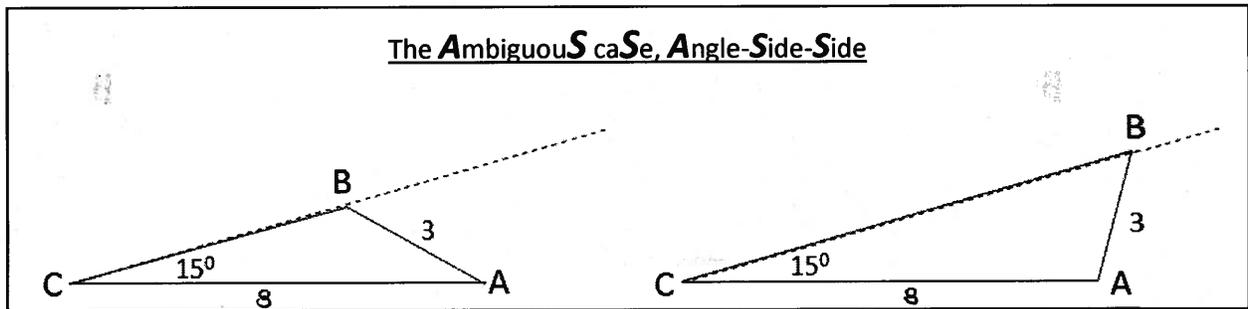
$$\begin{aligned} &\swarrow \\ &+0, -a \end{aligned}$$

$$\begin{aligned} &\searrow \\ &-0, +a \end{aligned}$$

$$\theta = 135^\circ \text{ or } 315^\circ$$

Part 7 – 2.3 The Sine Law

Use the following information to answer Q23:

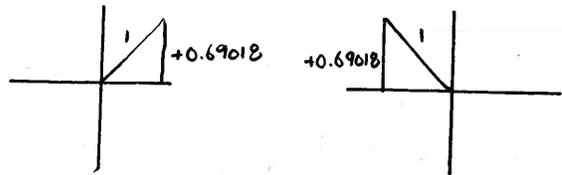
Q23: Determine the two possible values of $\angle B$.

$$\frac{\sin 15}{3} = \frac{\sin B}{8}$$

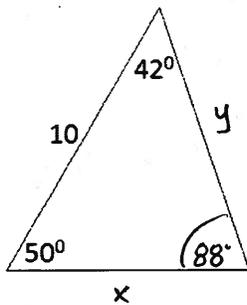
$$\sin B = 0.69018$$

$$\angle B = 43.6^\circ \text{ or } 180 - 43.6^\circ$$

$$\boxed{\angle B = 43.6^\circ \text{ or } 136.4^\circ}$$



Q24: Solve the triangle below.



$$\frac{\sin 88}{10} = \frac{\sin 42}{x}$$

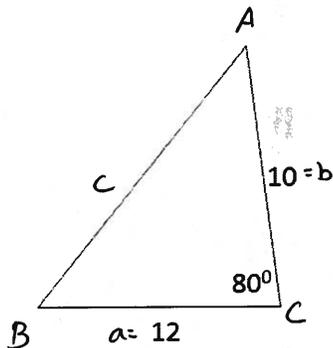
$$\boxed{x = 6.7}$$

$$\frac{\sin 88}{10} = \frac{\sin 50}{y}$$

$$\boxed{y = 7.7}$$

Part 8 – 2.4 The Cosine Law

Q25: Solve the triangle below.



$$c^2 = a^2 + b^2 - 2ab \cos C$$

$$c^2 = 12^2 + 10^2 - 2(12)(10) \cos 80^\circ$$

$$c^2 = 144 + 100 - 240 \cos 80^\circ$$

$$c^2 = 144 + 100 - 41.67 \dots$$

$$c^2 = 202.32$$

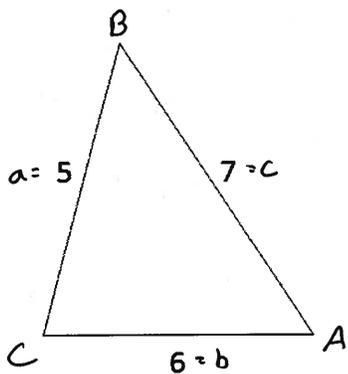
$$\boxed{c = 14.2}$$

$$\frac{\sin A}{12} = \frac{\sin 80^\circ}{14.2}$$

$$\boxed{\angle A = 56.3^\circ}$$

$$\boxed{\angle B = 43.7^\circ}$$

Q26: Solve the triangle below.



$$c^2 = a^2 + b^2 - 2ab \cos C$$

$$7^2 = 5^2 + 6^2 - 2(5)(6) \cos C$$

$$49 = 25 + 36 - 60 \cos C$$

$$-12 = -60 \cos C$$

$$0.2 = \cos C$$

$$\boxed{\angle C = 78.5^\circ}$$

$$\frac{\sin 78.5^\circ}{7} = \frac{\sin A}{5}$$

$$\boxed{\angle A = 44.4^\circ}$$

$$\boxed{\angle B = 57.1^\circ}$$