

Name: key Date: _____ Per: _____

Essential Skill Concept Category
ES 5: Quadratic Functions
ES 4: Trigonometry
ES 3: Solids

Show ALL your work. Be sure to circle/box your answers or write your final answers in the answer spaces. Explanations must logical and easy to understand; your thinking needs to be clearly expressed on the paper. Round your answers to the nearest tenth, unless otherwise specified.

1. Circle the equation that is written in intercept form. Convert it to standard form.

$y = 2(x-2)(x+3)$ $y = a(x-p)(x-q)$ $y = 2(x-3)^2 + 1$ $y = 3x^2 + 4x - 1$

$2(x-2)(x+3)$
 $(2x-4)(x+3)$ FOIL

$y = 2x^2 + 6x - 4x - 12$ combine like terms
 $= 2x^2 + 2x - 12$

Standard Form : $y = 2x^2 + 2x - 12$

2. Find the equation of a parabola that passes through point (-1, 3) and has a vertex (3, 2). Leave your answer in vertex form. Explain your reasoning in complete sentences.

$y = a(x-h)^2 + k$

$x = -1$ $y = 3$
 $h = 3$ $k = 2$

(h, k) represents the vertex
 $h = 3$ $k = 2$ in this situation
 $(-1, 3)$ represent a specific x & y value that works for the function
 * plug in what you are given
 only missing variable is a
 ↳ must solve for a

$3 = a(-1-3)^2 + 2$
 $3 = a(-4)^2 + 2$
 $3 = a(16) + 2$
 $3 = 16a + 2$
 -2 -2

$\frac{1}{16} = \frac{16a}{16}$ $a = \frac{1}{16}$

Don't forget about ACE-M!

function = $y = \frac{1}{16}(x-3)^2 + 2$

Integrated Math 2

3. Identify the a, h, and k. State the vertex, axis of symmetry, and range. Graph the function below.

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

function in vertex form

$$y = a(x-h)^2 + k \quad a = -2 \quad h = -2 \quad k = 4$$

the vertex is (h, k), so $(-2, 4)$

The axis of symmetry is $x = h$, so $x = -2$

$a < 0$, so parabola opens downward, and the vertex represents the maximum value for y.

a = -2

h = -2

k = 4

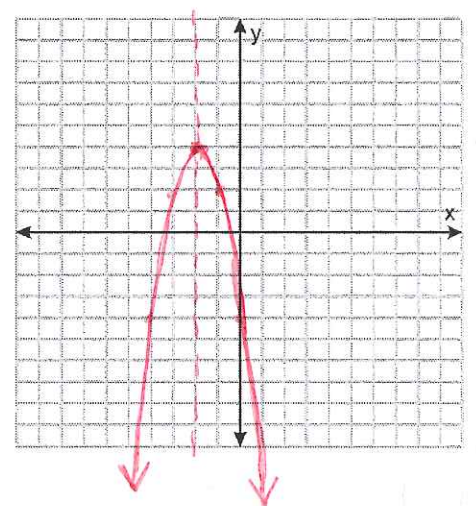
axis of symmetry: $x = -2$

vertex: $(-2, 4)$

range: $(-\infty, 4]$

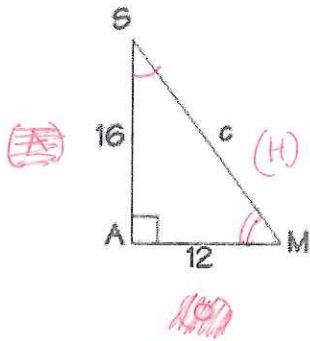
x	$y = -2(x+2)^2 + 4$
-1	$-2(-1+2)^2 + 4$
0	$-2(0+2)^2 + 4$
1	$-2(1+2)^2 + 4$
2	$-2(2+2)^2 + 4$

Find 2 other points on the curve and then use property of symmetry to identify the corresponding reflected points.



Integrated Math 2

4. Solve for the value of c . Then find the following trigonometric ratios. (ES 3)



Right Δ , so use Pythagorus

$$12^2 + 16^2 = c^2$$

$$144 + 256 = c^2$$

$$\sqrt{400} = \sqrt{c^2}$$

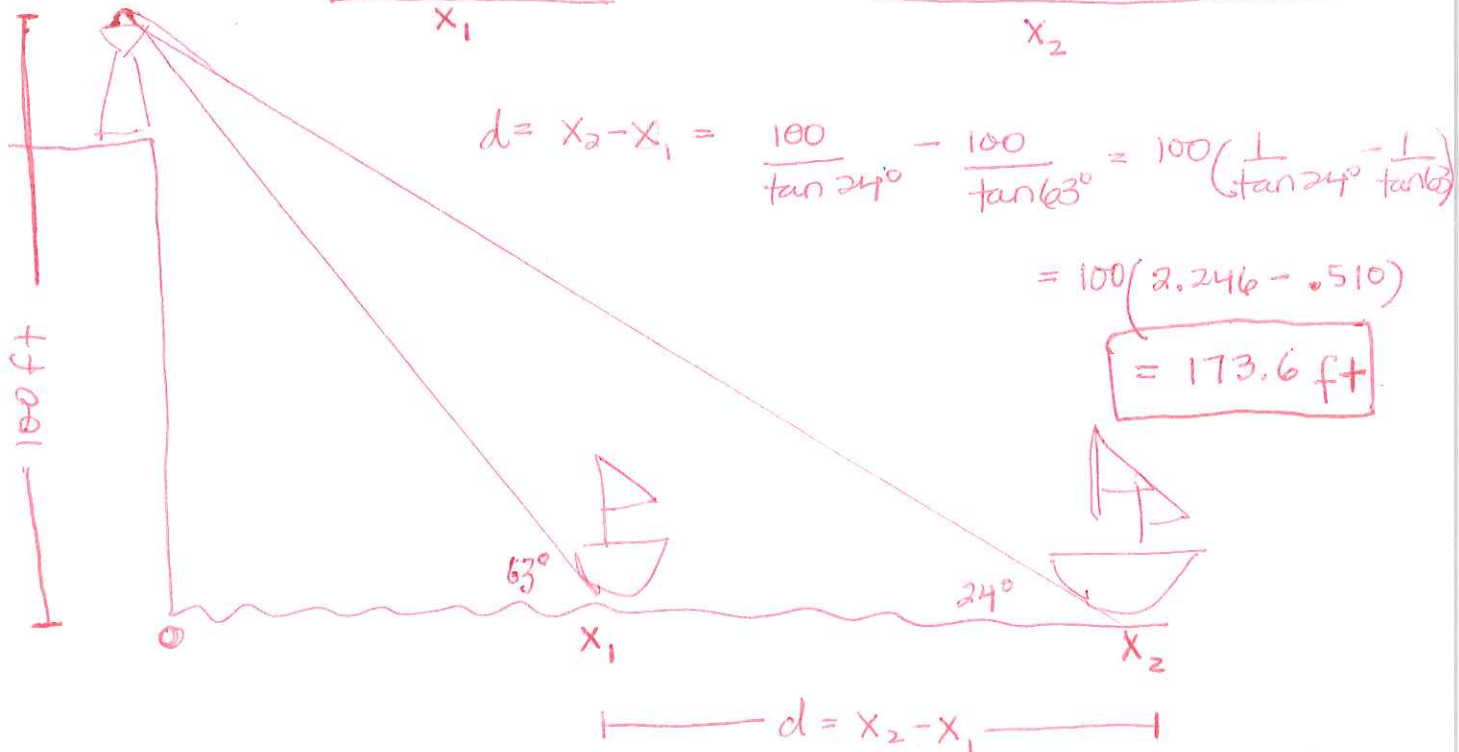
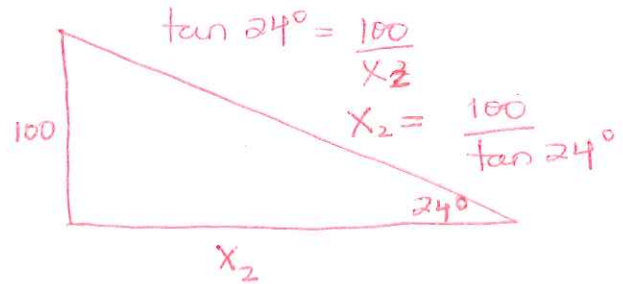
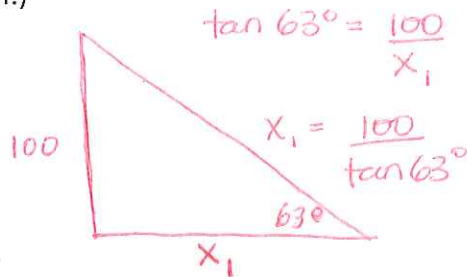
$$c = 20$$

$\frac{O}{H}$ sin M: $\frac{16}{20}$ or $\frac{4}{5}$

$\frac{A}{H}$ cos M: $\frac{12}{20}$ or $\frac{3}{5}$

$\frac{O}{A}$ tan S: $\frac{12}{16}$ or $\frac{3}{4}$

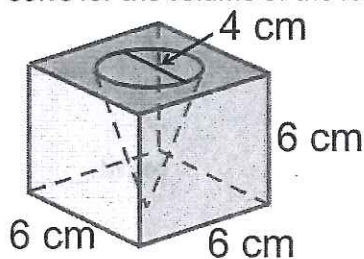
5. From the top of a lighthouse that stands 100 foot above the water, Joe spots two boats in the distance. The boat that is closer to the lighthouse has an angle of elevation of 63° to the top of the lighthouse. The second boat has an angle of elevation of 24° to the top of the lighthouse. Find the distance between the two boats (Draw a diagram!)



Don't forget about ACE-M!

Integrated Math 2

6. Solve for the volume of the following figure. Round to the nearest tenth, if necessary. (ES 4)



$$\text{Total Volume} = \text{Vol}_{\text{cube}} - \text{Vol}_{\text{cone}}$$

$$\text{Vol}_{\text{cube}} = l \times w \times h = 6 \cdot 6 \cdot 6 = 216 \text{ cm}^3$$

$$\text{Vol}_{\text{cone}} = \frac{1}{3} \pi r^2 h \quad * \text{ need } r \text{ and } h$$

height of cone is same as height of cube, so $h = 6 \text{ cm}$

Diameter of cone is 4 cm, so $r = 2 \text{ cm}$ ($r = \frac{1}{2} D$)

$$\text{Vol}_{\text{cone}} = \frac{1}{3} \pi (2)^2 (6) = 8\pi \text{ cm}^3$$

$$\begin{aligned} \text{Total Volume} &= 216 \text{ cm}^3 - 8\pi \text{ cm}^3 \text{ or } (216 - 8\pi) \text{ cm}^3 \\ &= \underline{190.9 \text{ cm}^3} \end{aligned}$$