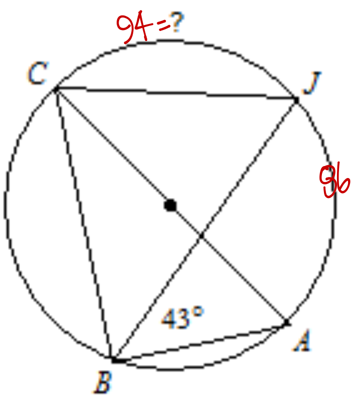
Solve each of the following problems. Your solutions must be organized and neat, as well as justified appropriately and properly to receive partial to full credit.

(1a) Consider the following diagram. Find $m\widehat{CJ}$.

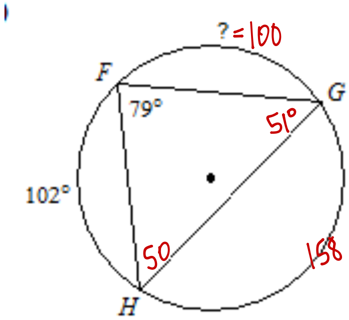


$m\widehat{CJ} =$ 94°

Explain in words your reasoning on finding $m\widehat{CJ}$ using correct geometric terminology.

Since <JBA's intercepted arc is JA, then JA is twice the measure of <JBA. Also, CJA is a semicircle (180°) and JA is a part of this semicircle, the the sum of JA and CJ is 180°.

(1b) Consider the following diagram. Find $m\widehat{FG}$ and $m\angle FHG$.



$m\angle FHG =$ 50°

$m\widehat{FG} =$ 100°

Explain in words your reasoning on finding $m\angle FHG$ using correct geometric terminology.

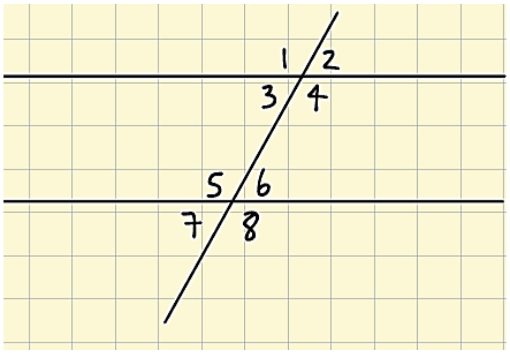
Since <FGH's intercepted arc is FH, so <FGH = 51° because FH is twice of the measure of <FGH. Using the Triangle Sum Theorem <F + <G + <H = 180°, so <H is 50°.

Explain in words your reasoning on finding $m\widehat{FG}$ using correct geometric terminology.

Since <FHG's Interupted arc is FG, so FG = 100° because <FHG is twice of the measure of FH.

Solve each of the following problems. Your solutions must be organized and neat, as well as justified appropriately and properly to receive partial to full credit.

Use Diagram 2 to answer the information.



(2a) Consider $< 1 = 11x - 1$ *and* $< 8 = 9x + 11$. Find x.

$11x - 1 = 9x + 11$
$2x - 1 = 11$
$2x = 12$
$x = 6$

(2b) Explain in words your reasoning in determining (1a).

<1 and <8 are congruent because the 2 angles are alternate exterior angles.

(2c) Find <3. Explain in words your reasoning in determining this considered angle.

$<1 = 11(6) - 1 = 65°$
$<3 = 180 - 65 = 115°$

<3=115° because <1 and <3 are supplementary since the 2 angles are a liniar pair.

Solve each of the following problems. Your solutions must be organized and neat, as well as justified appropriately and properly to receive partial to full credit.

Jaden's ball is thrown upwards from a rooftop, 80 meters above the ground. It will reach a maximum vertical height and fall back to the ground. The height of the ball from the ground at time t seconds is given by the height function,

$$h(t) = -16t^2 + 64t + 80.$$

(3a) What is the height reached by the ball after 1 second?

$h(t) = -16t^2 + 64t + 80$

$t = 3$ seconds

$h(3) = -16(3)^2 + 64(3) + 80 = 128$ meters

(3b) What is the maximum height reached by the ball? Explain how you found your answer.

need to find vertex:

$x = -\frac{b}{2a} = \frac{-64}{2(-16)} = 2.$

$y = h(2) = -16(2)^2 + 64(2) + 80 = 144$

vertex: $(2, 144)$

The maximum height of the toss is 144 meters.

The vertex y-value gives the height because the vertex gives the extrema. In this context, the extrema is a maximum.

(3c) How long will it take before hitting the ground? Explain how you found your answer.

$h(t) = -16t^2 + 64t + 80$

$= -16(t^2 - 4t + 5)$

$= -16(t-5)(t+1)$

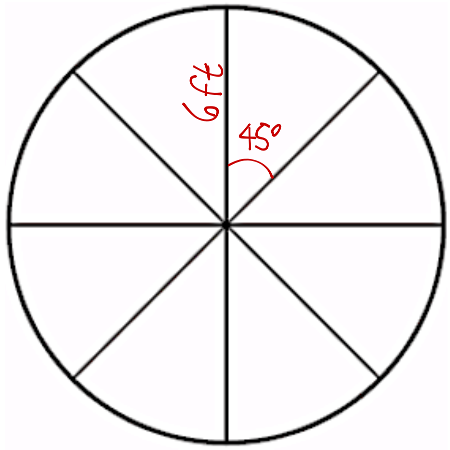
$= t = 5$ or $\cancel{t = -1}$

At $t = 5$ seconds, the ball hits the ground.

The ball hitting the ground is when the height is at 0 meters.

Solve each of the following problems. Your solutions must be organized and neat, as well as justified appropriately and properly to receive partial to full credit.

Billy is creating a circular garden divided into 8 equal sections. The diameter of the garden is 12 feet.



$\frac{360°}{8 \text{ sections}} = 45°$

(4a) What is the area of one section of the garden? *Explain how you determined your answer.*

$\text{Area}_{\text{sector}} = \left(\frac{\text{arc measure}}{360°}\right)(\pi r^2) = \left(\frac{45°}{360}\right)(\pi 6^2)$

$\boxed{\frac{9\pi}{2} \text{ ft}^2 \text{ or } 14.14 \text{ ft}^2}$

To get the area of a section, one must first find the area of the circle & use the angle measure of one section to find the area of one section.

(4b) What is the distance between each section of the garden? *Explain how you determined your answer.*

$\text{Arc Length} = \left(\frac{\text{arc measure}}{360°}\right)(2\pi r) = \left(\frac{45}{360}\right)(2\pi(6))$

$\boxed{\frac{3\pi}{2} \text{ ft or } 4.71 \text{ ft}}$

To get the distance of one section of the garden, one must find the circumference of the circle & use the angle measure of one section to find the distance between each section.

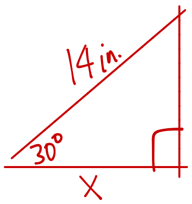
Solve each of the following problems. Your solutions must be organized and neat, as well as justified appropriately and properly to receive partial to full credit.

Jane and Mark each build ramps to jump their remote-controlled cars.

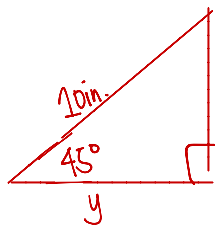
Both ramps are right triangles when viewed from the side. The incline of Jane's ramp has an angle of elevation of 30 degrees and the length of the inclined ramp is 14 inches. The incline of Mark's ramp has an angle of elevation of 45 degrees and the length of the inclined ramp is 10 inches.

(5a) What is the horizontal length of the base of Jane's ramp and the base of Mark's ramp? *Show or explain your work.*

Jane's Ramp



Mark's Ramp



Jane's:

$\cos 30° = \frac{x}{14\text{in}}$

$14 \cos 30° = x$

$7\sqrt{3}\text{in} = x$

$12.12\text{in} \approx x$

Mark's:

$\cos 60° = \frac{y}{10}$

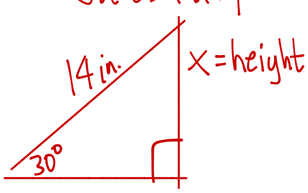
$10 \cos 45° = y$

$5\sqrt{2}\text{in} = y$

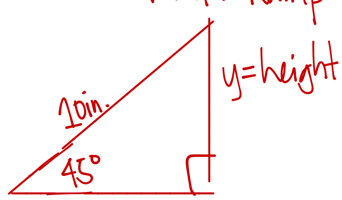
$7.07\text{in} \approx y$

(5b) Which car is launched from the highest point? Justify your answer by providing an explanation.

Jane's Ramp



Mark's Ramp



Jane's:

$\sin 30° = \frac{x}{14}$

$x = 14 \sin 30°$

$x = 7$

Mark's:

$\sin 45° = \frac{y}{10}$

$y = 10 \sin 45°$

$y = 7.07$

Mark's height is the highest at 7.07inches making Mark's car launched the highest point.