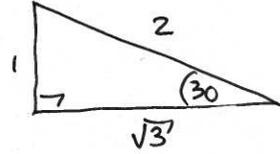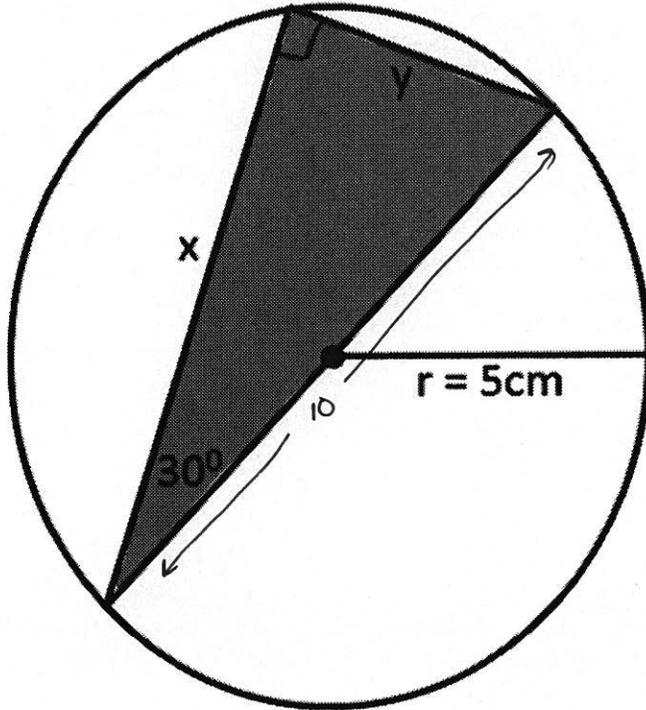## L63 – Word Problems

Part 1 – Circle Geometry and Angles Inscribed in a Semi-Circle

Q1: Calculate the area of the shaded region:

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

$\cos 30° = \dfrac{x}{10}$ and $\cos 30° = \dfrac{\sqrt{3}}{2}$

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

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

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

$\sin 30 = \dfrac{y}{10}$ $\sin 30° = \dfrac{1}{2}$

$$\dfrac{y}{10} = \dfrac{1}{2}$$

$$\boxed{y = 5}$$

$\text{AREA} = \dfrac{1}{2}(b)(h)$

$\qquad = \dfrac{1}{2}(5\sqrt{3})(5)$

$$\boxed{\text{AREA} = \dfrac{25\sqrt{3}}{2}}$$

Part 2 – Radical Equations

Use the following information to answer Q2:

Two go-carts are racing. One go-cart has a constant rate of acceleration, and it's speed is modelled by the equation:

$$v_A = t$$

Shortly after the first go-cart starts, the second go-cart accelerates at a non-uniform rate. It's speed is modelled by the equation:

$$v_B = \sqrt{10t - 16}$$

Q2: Algebraically determine the time(s) that the carts are travelling at the same speed.

$$v_A = v_B$$

$$\sqrt{10t - 16} = t$$

$$10t - 16 = t^2$$

$$0 = t^2 - 10t + 16$$

$$0 = (t - 2)(t - 8)$$

$$t = 2 \qquad t = 8$$

VERIFY

$$\sqrt{10(2) - 16} = (2)$$
$$\sqrt{20 - 16} = 2$$
$$\sqrt{4} = 2$$
Yes!

VERIFY

$$\sqrt{10(8) - 16} = (8)$$
$$\sqrt{80 - 16} = 8$$
$$\sqrt{64} = 8$$
Yes!

They have the same speed at $t = 2$sec and $t = 8$ sec.