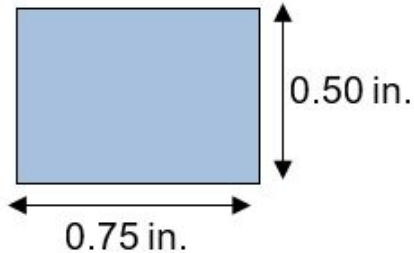


Activity 2.1.1 Centroids Worksheet

Identify the centroid location of the shapes below. **Calculate the X and Y locations of the centroid.** 10 Points each

1.



Formulas

$$x = 1/2 * \text{base}$$

$$y = 1/2 * \text{height}$$

Substitute / Solve

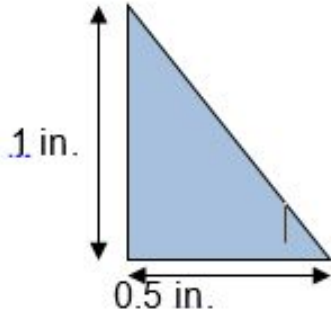
$$x = 1/2 * 0.75 \text{ in}$$
$$= 0.375 \text{ in}$$

$$y = 1/2 * 0.5 \text{ in}$$
$$= 0.25 \text{ in}$$

Answer

(0.375 in, 0.25 in)
(0.38 in, 0.25 in) <-- sig figs

2.



Formulas

$$x = 1/3 * \text{base}$$

$$y = 1/3 * \text{height}$$

Substitute / Solve

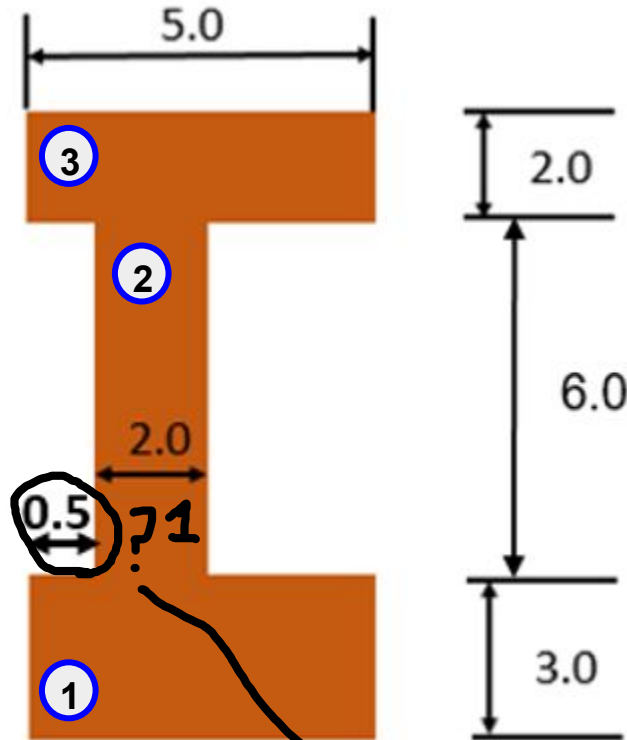
$$x = 1/3 * 0.5 \text{ in}$$
$$= 0.16667 \text{ in}$$

$$y = 1/3 * 1 \text{ in}$$
$$= 0.33333 \text{ in}$$

Answer

(0.16667 in, 0.33333 in)
(0.2 in, 0.3 in)

3. Identify the centroid location X and Y position of the object. Decide whether you will use the additive or subtractive method. Either is correct. Make sure you reference from the lower left hand corner (the 0,0 point) of the object for all your pieces. **20 Points**

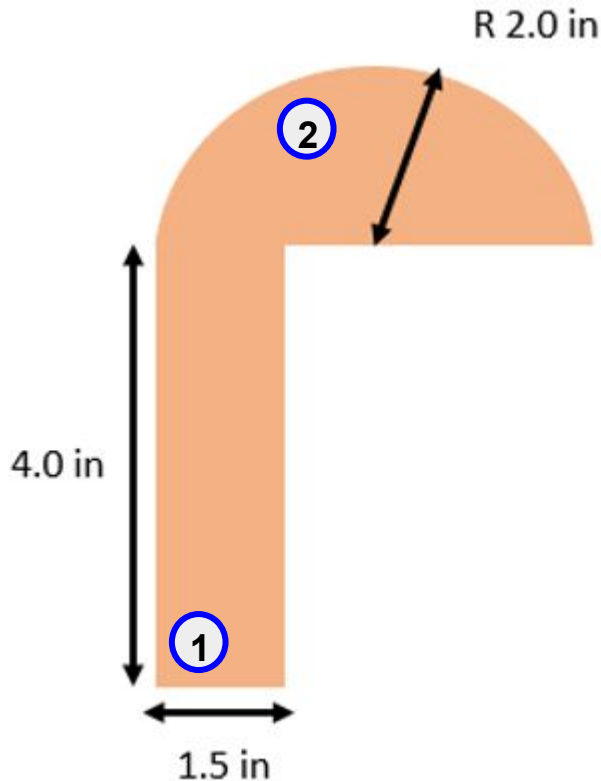


| | xi | Ai | xi * Ai |
|--------|---------------------|-------------------|-------------------|
| 1 | $5.0 / 2 = 2.5$ | $5.0 * 3.0 = 15$ | $2.5 * 15 = 37.5$ |
| 2 | $0.5 + 2.0/2 = 1.5$ | $2.0 * 6.0 = 12$ | $1.5 * 12 = 18$ |
| 3 | $5.0 / 2 = 2.5$ | $5.0 * 2.0 = 10.$ | $2.5 * 10. = 25$ |
| Total: | | 37 | 80.5 |
| | yi | Ai | yi * Ai |
| 1 | $3.0 / 2 = 1.5$ | $5.0 * 3.0 = 15$ | $1.5 * 15 = 22.5$ |
| 2 | $3.0 + 6.0/2 = 6.0$ | $2.0 * 6.0 = 12$ | $6.0 * 12 = 72$ |
| 3 | $9.0 + 2.0/2 = 10.$ | $5.0 * 2.0 = 10.$ | $10. * 10. = 100$ |
| Total: | | 37 | 194.5 |

$$\bar{x} = \frac{\sum \bar{x}_i A_i}{\sum A_i} = \frac{80.5}{37} = \frac{2.17568}{2} = 2.2$$

$$\bar{y} = \frac{\sum \bar{y}_i A_i}{\sum A_i} = \frac{194.5}{37} = \frac{5.25676}{5.3} = 5.3$$

4. Identify the centroid location X and Y position of the object. **20 Points**

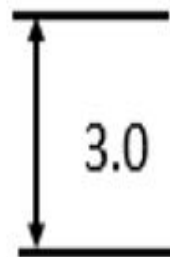
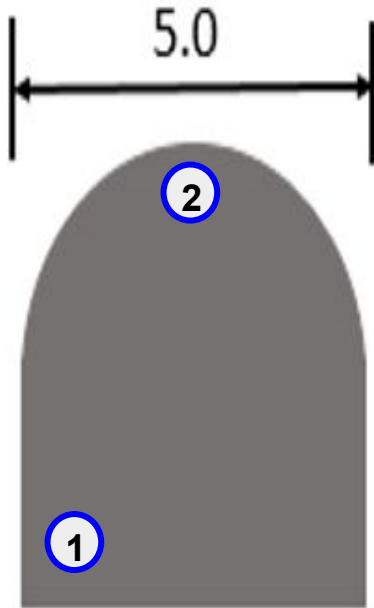


| | xi | Ai | xi * Ai |
|---------------|---|---------------------------|---------------------------|
| 1 | $1.5 / 2 = 0.75$ | $1.5 * 4.0 = 6.0$ | $0.75 * 6.0 = 4.5$ |
| 2 | $2.0 = 2.0$ | $(3.14 * 2.0^2)/2 = 6.28$ | $2.0 * 6.28 = 12.56$ |
| Total: | | | 17.06 |
| | yi | Ai | yi * Ai |
| 1 | $4.0 / 2 = 2.0$ | $1.5 * 4.0 = 6.0$ | $2.0 * 6.0 = 12$ |
| 2 | $4.0 + (4 * 2.0 / (3 * 3.14)) = 4.8493$ | $(3.14 * 2.0^2)/2 = 6.28$ | $4.8493 * 6.28 = 30.4536$ |
| Total: | | | 42.4536 |

$$\bar{x} = \frac{\sum \bar{x}_i A_i}{\sum A_i} = \frac{17.06}{12.28} = 1.4$$

$$\bar{y} = \frac{\sum \bar{y}_i A_i}{\sum A_i} = \frac{42.4536}{12.28} = 3.5$$

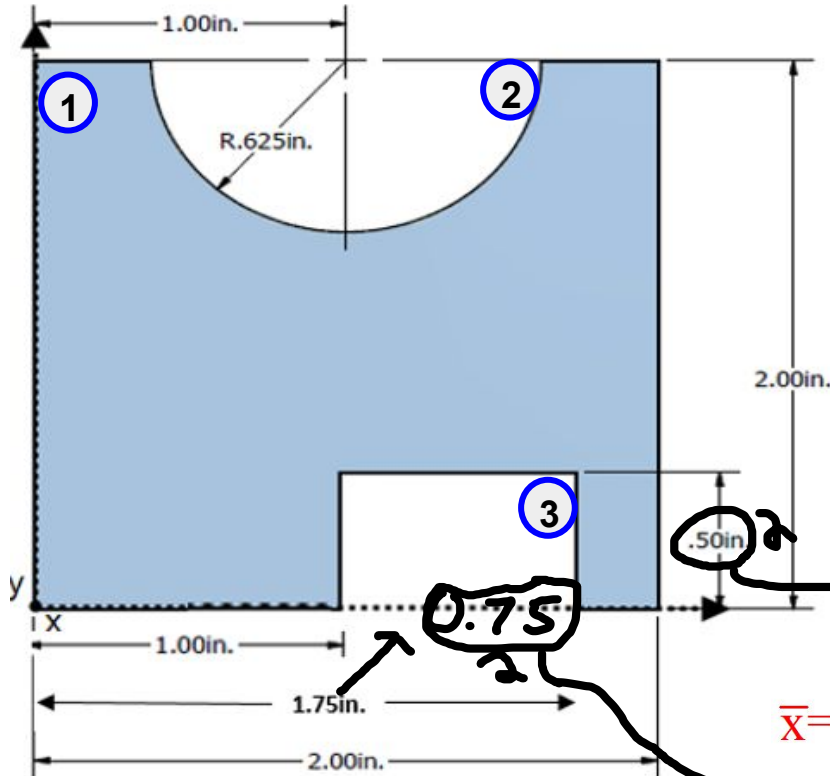
5. Identify the centroid location X and Y position of the object. **20 Points**



| | xi | Ai | xi * Ai |
|---------------|--|-----------------------------|------------------------------|
| 1 | $5.0 / 2 = 2.5$ | $5.0 * 3.0 = 15$ | $2.5 * 15 = 37.5$ |
| 2 | $5.0 / 2 = 2.5$ | $3.14 * 2.5^2 = 9.8125$ | $2.5 * 9.8125 = 24.53125$ |
| | | | |
| Total: | | 24.8125 | 62.03125 |
| | yi | Ai | yi * Ai |
| 1 | $3.0 / 2 = 1.5$ | $5.0 * 3.0 = 15$ | $1.5 * 15 = 22.5$ |
| 2 | $3.0 + (4 * 2.5 / (3 * 3.14)) = 4.06157$ | $3.14 * 2.5^2 / 2 = 9.8125$ | $4.06157 * 9.8125 = 39.8542$ |
| | | | |
| Total: | | 24.8125 | 62.3542 |

$$\bar{x} = \frac{\sum \bar{x}_i A_i}{\sum A_i} = \frac{62.03125}{24.8125} = 2.5 \quad \bar{y} = \frac{\sum \bar{y}_i A_i}{\sum A_i} = \frac{62.3542}{24.8125} = 2.5130 = 2.5$$

6. Identify the centroid location X and Y position of the object. **20 Points**



| | xi | Ai | xi * Ai |
|--------|--|----------------------------------|-------------------------------|
| 1 | $2.00 / 2 = 1.00$ | $2.00 * 2.00 = 4.00$ | $1.00 * 4.00 = 4.00$ |
| 2 | 1.00 | $-3.14 * 0.625^2 / 2 = -0.61328$ | $1.00 * -0.61328 = -0.61328$ |
| 3 | $1.00 + (0.750 / 2) = 1.375$ | $0.750 * 0.50 = -0.375$ | $1.375 * 0.375 = -0.515625$ |
| Total: | | 3.01172 | 2.871095 |
| | yi | Ai | yi * Ai |
| 1 | $2.00 / 2 = 1.00$ | $2.00 * 2.00 = 4.00$ | $1.00 * 4.00 = 4.00$ |
| 2 | $2.00 - (4 * 0.625 / (3.14 * 3)) = 1.7346$ | $-3.14 * 0.625^2 / 2 = -0.61328$ | $1.7343 * -0.61328 = -1.0636$ |
| 3 | $0.50 / 2 = 0.25$ | $0.750 * 0.50 = -0.375$ | $0.25 * -0.375 = -0.09375$ |
| Total: | | 3.01172 | 2.84265 |

$$\bar{X} = \frac{\sum \bar{x}_i A_i}{\sum A_i} = \frac{2.871095}{3.01172} = 0.953307 \approx 0.95$$

$$\bar{Y} = \frac{\sum \bar{y}_i A_i}{\sum A_i} = \frac{2.84265}{3.01172} = 0.94386 \approx 0.94$$