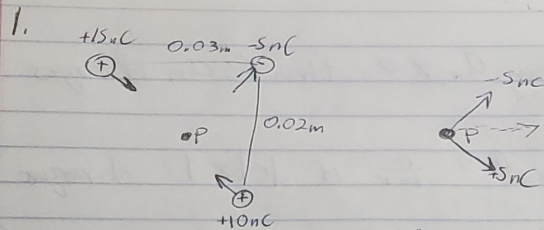


# PHYS 408



$$V = \frac{kq}{r}$$

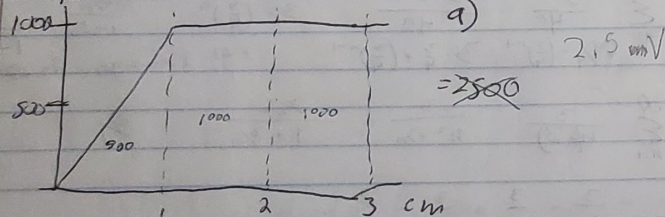
$$2 \left( \frac{kq}{r} \cos 33.7^\circ \right) = 8.32 \text{ nC}$$

$$\frac{kq}{r} = \frac{2500}{0.08} = 31250 = V_{\text{net}}$$

2.

I would need to calculate the sum of the vectors in addition to what I just did

3. V/m



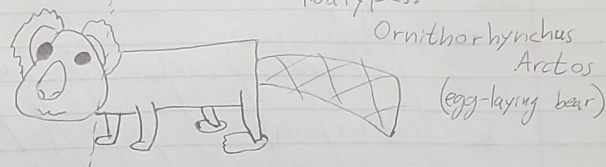
b)

$$0 = V_{g2} + \frac{1}{2} m v_f^2$$

$$V_f = \sqrt{\frac{2V_{g2}}{m}} = 6925.61 \text{ m/s}$$

# PHYS 408

4.



5.

a)

$$A = \pi r^2 \rightarrow \pi (25 \text{ nm})^2 = A_A$$

$$\pi (0.8 \text{ fm})^2 = A_P$$

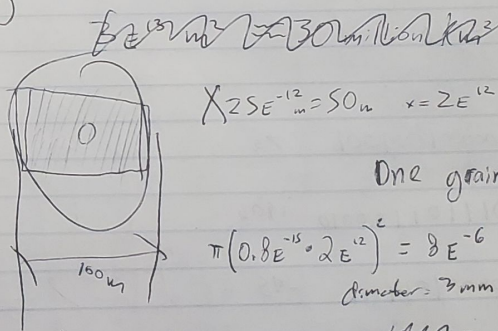
$$A_A - A_P = A_E = 1.96 \text{ E}^{-21} \approx 2 \text{ nm}$$

$$r_{\text{op}} = 100 \text{ nm} = 0.8 \text{ E}^{-15} \cdot x$$

$$x = 1.25 \text{ E}^{-17}$$

$$SO = 0.$$

b)



6.

a)

$$\sum_{n=1}^{20} 2^n$$

b) \$1,048,575.00

c) \$629,145.00

```

/**
 * @author Nick Snyder
 * @version 5 November 2021
 */
public class Tardigrades {

    /**
     * @param args String[]
     */
    public static void main(String[] args) {

        int startingNum = 2;
        int currentNum = 0;
        double operatingCost = 0;

        for (int n = 1; n <= 20; n++) {

            int operation = (int) Math.pow(startingNum, n);

            currentNum += operation;

            operatingCost += (double) operation * 0.2;

            System.out.printf("day: %2d  ", n);
            System.out.printf("new today: %7d  ", operation);
            System.out.printf("total: %8d  ", currentNum);
            System.out.printf("operating cost: $%.2f\n", operatingCost);
        }

        System.out.printf("Total revenue: $%.2f\n", (double) currentNum * 0.5);
        System.out.printf("Total operating cost: $%.2f\n", operatingCost);
        System.out.printf("Profit: $%.2f", currentNum * 0.5 - operatingCost);
    }
}

```

day: 1	new today:	2	total:	2	operating cost:	\$0.40
day: 2	new today:	4	total:	6	operating cost:	\$1.20
day: 3	new today:	8	total:	14	operating cost:	\$2.80
day: 4	new today:	16	total:	30	operating cost:	\$6.00
day: 5	new today:	32	total:	62	operating cost:	\$12.40
day: 6	new today:	64	total:	126	operating cost:	\$25.20
day: 7	new today:	128	total:	254	operating cost:	\$50.80
day: 8	new today:	256	total:	510	operating cost:	\$102.00
day: 9	new today:	512	total:	1022	operating cost:	\$204.40
day: 10	new today:	1024	total:	2046	operating cost:	\$409.20
day: 11	new today:	2048	total:	4094	operating cost:	\$818.80
day: 12	new today:	4096	total:	8190	operating cost:	\$1638.00
day: 13	new today:	8192	total:	16382	operating cost:	\$3276.40
day: 14	new today:	16384	total:	32766	operating cost:	\$6553.20
day: 15	new today:	32768	total:	65534	operating cost:	\$13106.80
day: 16	new today:	65536	total:	131070	operating cost:	\$26214.00
day: 17	new today:	131072	total:	262142	operating cost:	\$52428.40
day: 18	new today:	262144	total:	524286	operating cost:	\$104857.20
day: 19	new today:	524288	total:	1048574	operating cost:	\$209714.80
day: 20	new today:	1048576	total:	2097150	operating cost:	\$419430.00
Total revenue: \$1048575.00						
Total operating cost: \$419430.00						
Profit: \$629145.00						