Measurement Task 1

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section 1

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1 Exercise 8

Determine in the appropriate SI units the value with the correct number of significant figures of the work done by a $1.460 \times 10^6 lbf$ force over a $2.3476m$
Solution
Force in newtons=$\frac{1.460 \times 10^6}{0.2248}$=$6494661.922N$
Force in significant figures=$6.495 \times 10^6 N$
Work=$Force \times distance$
Work=$6.495 \times 10^6 \times 2.3476 = 15.247662 \times 10^6$Joules
Work in significant figures=1.524×10^7joules
If we continue with the original force, then:
Work=$6494661.922 \times 2.3476 = 1524686.33$ joules
Then work in significant figures=1.5247×10^7 joules

2 Exercise 7

How many significant figures does the number 001001.0110 have ??
Solution
8 significant figures

3 Exercise 9

The proof for wheatstone bridge:
Using KVL on outer loop:
$-E_o - I_3R_3 + I_1R_1 = 0$
Then $E_o = I_1R_1 - I_3R_3$
Then $E_o = V_1 - V_3$
Because $I_1 = I_2$ and$I_3 = I_4$ and and by using voltage divider:
$E_o = \frac{E_iR_1}{R_1+R_2} - \frac{E_iR_3}{R_3+R_4}$
To derive the balance equation:

Put $E_o = 0$
Then $\frac{R_1}{R_1+R_2} = \frac{R_3}{R_3+R_4}$
Then $R_1(R_3 + R_4) = R_3(R_1 + R_2)$
Then $R_1R_4 = R_3R_2$
Then $\frac{R_1}{R_2} = \frac{R_3}{R_4}$

4 Exercise 10

when wheatstone bridge is balanced:
a. $\frac{R_1}{R_2} = \frac{R_3}{R_4}$
If $R_1 = 1\Omega$, $R_2 = 3\Omega$ and $R_3 = 2\Omega$
Then $R_4 = 6\Omega$

b.Bridge output voltage = 0 volts