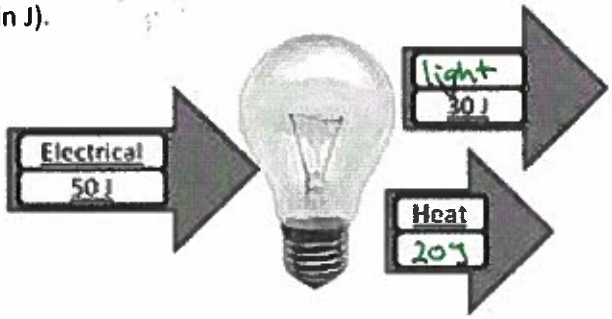
Assignment #5 Ch3 **% Energy Efficiency & Velocity** Name: _____

$v = \frac{d}{\Delta t}$ **% energy efficiency =** $\frac{\text{useful energy}}{\text{consumed energy}}$ **x 100** /20

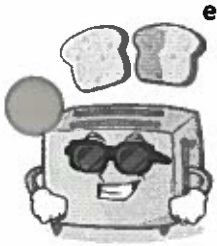
Show your work for each question by indicating the formula, showing the #s in your formula and giving the units of your final answer. Due: Monday, Dec. 2nd,2019

1. For each example of energy transformation below, fill the missing boxes with the energy type and amount (in J).



consumed useful

2. A toaster uses 67 500J of electrical energy to toast a piece of bread. 50 625J are transformed into thermal energy, 15 000J into luminous energy and 1 875J is lost to other forms of energy. **Calculate the % energy efficiency of the buzzer.**



$\%EE = \frac{\text{useful}}{\text{consumed}} \times 100$

$= \frac{50\,625\,J}{67\,500\,J} \times 100$

$EE = 75\%$

3. Jan works out the efficiency of ~~one of~~ a windmill. The mechanical energy of the air hitting the blades of the windmills is 25 000 J each second. The energy transferred to the power lines is 5000 J each second. **What is the energy efficiency of the windmills?**

consumed useful

$\%EE = \frac{\text{useful}}{\text{consumed}} \times 100 = \frac{5000}{25\,000} \times 100 = 20\%$

4. A hairdryer is 77% energy efficient. How many joules of energy are wasted if it consumes 1500J of electrical energy?

$\frac{\%EE}{100} = \frac{\text{useful}}{\text{consumed}}$ $\frac{77}{100} = \frac{x}{1500}$

$1500 - 1155 = 345\,J$ $x = 1155\,J$

5. A hydroelectric dam has an efficiency of 52%. How much kinetic energy from the water is needed to produce 900J of electrical energy?

$\frac{\%EE}{100} = \frac{\text{useful}}{\text{consumed}}$ $\frac{52}{100} = \frac{900J}{x}$

$x = 1731\,J$

/10

6. If a buzzer uses 0.2A and 3V and buzzes for 1 min. 16J are transformed into sound energy, calculate the % energy efficiency of the buzzer.

$P = VI = 3 \times 0.2 = 0.6\,W$

$E = P\Delta t = 0.6(60s) = 36J$

$\%EE = \frac{\text{useful}}{\text{consumed}} \times 100$

$= \frac{16J}{36J}$

$\%EE = 44\%$

7. Shevon is skiing down a hill. The length of the hill is 1 900 m and it takes him 180 s to reach the bottom. Calculate his speed in km/hr.

$\div 1000 = 1.9\,km$

$\frac{180}{60} = 3\,min$

$\frac{3}{60} = 0.05h$

$V = \frac{d}{t} = \frac{1.900km}{0.05h} = 38\,km/h$

8. How far does a baseball travel if it is moving at 20 m/s for 7s?

$\frac{V}{1} = \frac{d}{t}$

$\frac{20\,m/s}{1} = \frac{x}{7s}$

$x = 140\,m$

9. How many hours does it take to travel 261 000 m if you are traveling at a speed of 87 km/h?

$\frac{V}{1} = \frac{d}{t}$ $\quad \frac{87\,km/h}{1} = \frac{261\,km}{t}$ $\quad 3hrs$

10. Which of the following cars is traveling the fastest?

	Distance	Time
Car A	1 650 m	1 min 21 sec
Car B	3 500 m	Half an hour
Car C	21.25 km	15 min
Car D	65 km	1 hr

$1m + 21 \div 60 = 0.35 = 1.35\,min$

C is the fastest

$30\,min$

$60\,min$

21250 m

65 000 m

$V = \frac{d}{t}$

(A) $V = \frac{1650}{1.35} = 1222\,m/min$

(B) $\frac{3500}{30} = 117\,m/min$

(C) $\frac{21250}{15} = 1417\,m/min$

(D) $\frac{65000}{60} = 1083\,m/min$

/10