**Year 8 Physics**

**Energy Fundamentals– Revision**

1. Unscramble the following terms and write them next to their definition in the table below:

A person standing next to each other

Description automatically generated

P O T E N T I A L

K I N E T I C

W O R K

E N E R G Y

|  |  |
| --- | --- |
| K I N E T I C | The energy of moving objects |
| P O T E N T I A L | Energy stored in objects |
| W O R K | The use of force to move an object |
| E N E R G Y | The ability to do work |

Joules

1. Which unit is used when measuring energy? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1000

1. How many joules are in a kilojoule? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. Convert:

76000 J

|  |  |  |  |
| --- | --- | --- | --- |
| 76 kJ to J |  | 270 J to kJ | 0.27 kJ |
| 400 kJ to J | 400000 J | 12 kJ to J | 12000 J |
| 0.019 kJ to J | 19 J | 278 kJ to J | 278000 J |
| 72 460 J to kJ | 72.46 kJ | 97862 J to kJ | 97.862 kJ |
| 900 000 J to kJ | 900 kJ | 8.7 kJ to J | 8700 J |
| 2.4 kJ to J | 2400 J | 1. 913 kJ to J | 23913000 J |

1000000

1. How many joules are in a megajoule? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1000

1. How many kilojoules are in a megajoule? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |  |  |
| --- | --- | --- | --- |
| 30 MJ to J | 30000000 J | 270 kJ to MJ | 0.27 MJ |
| 160 MJ to J | 160000000 J | 1200 kJ to MJ | 1.2 MJ |
| 24 MJ to J | 24000000 J | 1200 MJ to kJ | 1200000 kJ |
| 7 020 460 J to MJ | 7.02046 MJ | 901 862 kJ to MJ | 901.862 MJ |
| 900 000 J to MJ | 0.9 MJ | 8.7 MJ to kJ | 8700 kJ |
| * 1. MJ to J | 24000000 J | 1. kJ to MJ | 2.3 MJ |

1. a) Unscramble the 9 different types of energy:

A crossword puzzle with words

Description automatically generated

K I N E T I C

L I G H T

T H E R M A L

S O U N D

E L A S T I C

G R A V I T A T I O N A L

E L E C T R I C A L

C H E M I C A L

N U C L E A R

1. Sort the types of energy above into the correct groups:

|  |  |
| --- | --- |
| **Kinetic Energy** | **Potential Energy** |
| K I N E T I C  L I G H T  T H E R M A L  E L E C T R I C A L  S O U N D | G R A V I T A T I O N A L  C H E M I C A L  N U C L E A R  E L A S T I C |

1. Match the types of energy with their correct definition:

Chemical

|  |  |
| --- | --- |
|  | Energy stored in the bonds of chemical compounds. |
| Electrical | The energy found in electricity**,** of moving electrons |
| Kinetic | Energy possessed by an object due to its motion |
| Elastic | Energy stored in an object when it is stretched or compressed |
| Gravitational | Energy stored in an object due to its position above the ground. |
| Light  Sound | Energy caused by an object’s vibrations that allow us to hear |
| Nuclear | Energy carried by electromagnetic waves that allow us to see |
|  | Energy released what atoms split or get fused together |
| Thermal | A form of energy that is transferred by a difference in temperature |

1. Write the main type of energy associated with each item underneath the images:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Thermal |  | A blue balloon with a string  Description automatically generated  Sound |  | Nuclear |  | Chemical |
| Thermal |  | Kinetic |  |  | Gravitational | Sound |
| Electrical |  | Gravitational |  | Light (and thermal) |  | A drawing of a log  Description automatically generated  Chemical |
| Elastic |  | Gravitational |  | Elastic |  | Thermal |
| Chemical |  | Kinetic |  | Electrical |  | Mushroom Cloud Cartoon Stock Illustrations – 3,386 Mushroom Cloud Cartoon  Stock Illustrations, Vectors & Clipart - Dreamstime  Nuclear |

1. In which image below does the skateboarder have more gravitational potential energy?

A Explain why: The skateboarder in A is positioned higher above the Earth’s surface than the skateboarder in B.

|  |  |
| --- | --- |
| **A** | **B** |
| A person on a skateboard  Description automatically generated |  |

1. In the images above, which skateboarder has the most kinetic energy? B

Explain why: The skateboarder is moving down the ramp and their speed is increasing. As velocity or speed is directly proportional to kinetic energy, the greater the speed, the greater the kinetic energy.

1. Can you decide if Road Runner or the Coyote or has more Kinetic energy? Explain why/why not?

No. There is not enough information to determine who has more kinetic energy. Kinetic energy is determined by both mass and velocity. Whilst road runner is faster than coyote, road runner does not necessarily have as much kinetic energy.

1. What other information do we need to determine if the Road Runner or the Coyote has more kinetic energy?

We require the mass of the road runner, mass of the coyote and the speed at which each is moving to determine their kinetic energy.

Kinetic energy is the energy an object has because of its mass and velocity(speed).

Ek= ½ m v2

Ek = kinetic energy(J)

m= mass (kg)

v= velocity (m/s)

1. Calculate the kinetic energy of a 2 kg rock that has fallen off a ledge and is travelling at 20 m/s. Show full working out.

m = 2kg

v = 20 m/s

Ek = ?

Ek = ½ m v2

Ek = 0.5 x 2 x 202

Ek = 400 J

1. Calculate the kinetic energy of a 20 gram bullet travelling at 115 m/s. Show full working out.

m = 20 g = 0.02 kg

v = 115 m/s

Ek = ?

Ek = ½ m v2

Ek = 0.5 x 0.02 x 1152

Ek = 132.25 = 132 J (to 3SF)

1. \*Expert Question\* Determine the mass of a car that has 495000 J of energy and is travelling at 30.0 m/s. Show full working out.

m = ?

v = 30 m/s

Ek = 495000J

Ek = ½ m v2

495000 = 0.5 x m x 302

495000 = 450 m

m = 495000/450 = 1100 kg

Potential energy is the energy an object has because of its mass and height above the Earth.

Ep= mgh

Ep = potential energy(J)

m = mass (kg)

g = acceleration due to gravity (m/s/s) = 9.8 m/s/s

h = height above the Earth's surface

1. Calculate the potential energy of a 2 kg rock on a ledge 5.50 metres above the Earth's surface. Show full working out.

m = 2 kg

h = 5.50 m

g = 9.8 m/s/s

Ep = ?

Ep = m g h

Ep = 2 x 9.8 x 5.5

Ep = 107.8 = 108 J (to 3SF)

1. Calculate the potential energy of a 100 gram apple in a 3 metre tall tree. Show full working out.

m = 100 g = 0.1 kg

h = 3 m

g = 9.8 m/s/s

Ep = ?

Ep = m g h

Ep = 0.1 x 9.8 x 3

Ep = 2.94 J

1. \*Expert Question\* A boy standing on a 2.50 metre high balcony has a potential energy of 1600 J. What is the boy’s mass?

m = ?

h = 2.50 m

g = 9.8 m/s/s

Ep = 1600 J

Ep = m g h

1600 = m x 9.8 x 2.5

1600 = 24.5 m

m = 1600/24.5 = 65.3 kg (3SF)

END OF QUESTIONS